MEMBER OF THE A. B. C.

PAPER TRADE JOURNAL

THE INTERNATIONAL WEEKLY OF THE PAPER AND PULP INDUSTRY

FIFTIETH YEAR

PUBLISHED EVERY THURSDAY BY THE

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121 YEARS

A BIRTHDAY is not of great importance to anyone but him who has it—except that when a man or business has outlived the natural span each added year becomes of interest to an increasingly greater number.

Just what the natural span of life for a business should be is not determined, but on February 8th, Crane & Co. was 121 years old. On February 8th, 1801, the first Zenas Crane selected the site for his paper mill, and there now stands the group of mills known as the Crane Mills, all engaged in making paper as good as they can make it.

So the Crane Mills are 121 years old, and they know no better way of celebrating that fact than to keep on making paper as good as they can make it.

100% selected new rag stock
121 years' experience
Bank notes of 22 countries

Crane's

BUSINESS PAPERS

THE PAPER TRADE JOURNAL

Story of its Growth From Its Foundation, Fifty Years Ago by Howard Lockwood, Pioneer Trade Journal Publisher.

Was an Immediate Success From the First Issue, May 27, 1872, and Has Always Been the Leader in Its Field—Some of the Advertisers and Other Interesting Features of the First Issue—Lockwood's Directory of the Paper and Allied Trades, the Standard Work of Reference on Paper, First Published in 1873—Life Time of the Journal Has Been One of Great Progress in the Paper Industry.

Written Especially for the Anniversary Number by Henry J. Berger, Editor of the Paper Trade Journal.

The PAPER TRADE JOURNAL was issued for the first time May 27, 1872. The office of publication was then at 14 Park Place. This issue consisted of four pages of seven columns, the sheet being 18¼ inches by 23¾. The paper at first was issued as a semi-monthly, the dates of publication being the 1st and the 15th of the month.

On the first page appeared the most important news, and, as may be seen by referring to another page on which is printed a reproduction of the first issue, contained an article on "The Tariff on Paper, Books, Etc.," which is still a very live issue in the industry. Other matters included "The Sanitary Authorities and the Importation of Rags," "Manufacturing News," "Incorporations," etc.

On the second page, which was devoted in part to editorial matter, appeared a prospectus by Howard Lockwood, the founder, explaining the needs of a trade journal in the paper field and outlining the purpose of the PAPER TRADE JOURNAL. The principles outlined in this prospectus, which follows, have been the lines along which the PAPER TRADE JOURNAL has been conducted throughout all the fifty years of its existence:

Prospectus

"In introducing the first number of the PAPER TRADE JOURNAL to the public, we wish to call attention, first to the need of a high-toned and superior journal to represent the American paper interest, and, secondly, to the mode in which we propose to carry on this periodical.

"In all kinds of industry, owing to increased competition and other causes, it is becoming necessary to carry on business with greater exactness and care. Hence the periodical that will furnish full, trustworthy information in relation to any given interest cannot fail to benefit all those connected with that interest. Knowledge is power, and all the information relating to the paper manufacture and trade which can be presented will add to the knowledge of each subscriber and reader of such a journal and so increase his capacity for conducting his business successfully.

"As an organ of the latest ideas, discoveries and opinions of the trade, it will also become so representative in character as to prove indispensable to every paper dealer or manufacturer who wishes to know what others are doing in the occupations in which he is concerned.

"Such a periodical should have the following features, which will be found in the present JOURNAL:

"First. It should belong to and be conducted by persons who are in no way pecuniarily connected with the trade, so that its independence and freedom from personal bias or interest may be assured.

"Second. Its manager should have a good knowledge of the paper business, and of the wants of those in the trade. The proprietor of this journal having lately left the paper trade, in which he has had large experience, to become engaged in the publishing business, these two important conditions are hence fulfilled by him to the letter.

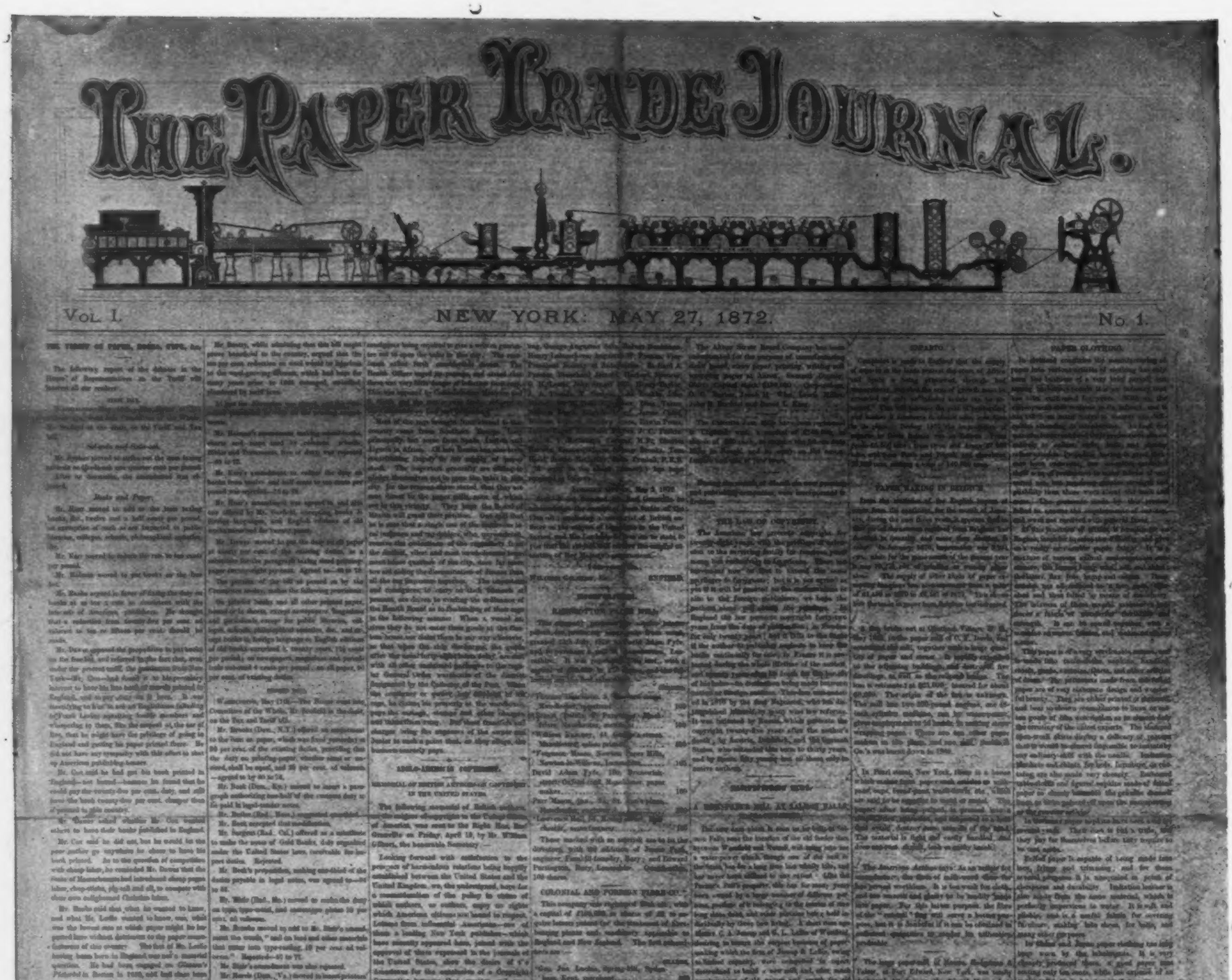
"Third. Such a journal should be issued at least twice a month, and even oftener if possible, in order to give frequent and fresh news of all kinds.

"Fourth. It should contain, together with articles on matters of interest to the trade, a careful review of the state of the market in the different grades of paper, paper stock, chemicals, coloring materials and all kinds of supplies, with reliable quotations of the same from unquestionable sources.

"Such are the features which we believe should belong to a good trade paper. Whether the present journal fulfills these conditions must be left to our readers to decide, but we can at least claim that having raised so high an ideal we are more likely to deserve support than if we had started with a lower standard of excellency."

HOWARD LOCKWOOD
THE FOUNDER OF THE PAPER TRADE JOURNAL

The principles enunciated in the



THE PAPER TRADE JOURNAL.

VOL. I. NEW YORK: MAY 27, 1872. No. 1.

FIRST PAGE OF THE FIRST ISSUE OF THE PAPER TRADE JOURNAL, MAY 27, 1872

ESPARTO:

ITS PLACES, CULTIVATION, PAST HISTORY AND FUTURE PROSPECTS.

A Paper read before the English Society of Arts, By Samuel Jamieson, Esq.

Important use of the Esparto Plant.—Esparto, or Spanish Grass, is a fibre which has for some years past been more or less familiar to the paper manufacturers of England. The Times is printed on paper made more or less from this material, and so are most of our leading journals, periodicals and current publications generally.

Rapid Increase in its Consumption.—In the year 1862, some 60 tons were imported. In 1872, the consumption had risen to over 170,000 tons; and in the past dozen months of the present year the imports have exceeded 120,000 tons, being to various degrees in excess of the importation of jute, wool, flax and hemp, and standing second to cotton only.

Its value, from £4 per ton in 1866, had risen to £10, which had been the current price during the present year, though today, owing to the arrival of the new crop, it is temporarily quoted at from £9 to £1 10s. less.

Object of the present Paper.—Owing to various circumstances, however, the peculiarities attending the growth and harvesting of the esparto plant, have never, as yet, received the attention which they deserve; and it will be the object of [illegible]

[illegible]

Fourfold Division.—It is designed first, then, to supply a few definite facts on the plant itself, and on the climate and soils that are specially favorable to its growth. Secondly, some account will be given of the time and mode of harvesting. Thirdly, a brief estimate will be taken of the quantity of esparto that may be inferred to have been in growth in Spain at the time of its first introduction into English trade, and, besides a mention of its local uses, it is more particularly proposed under this head to explain the rapid deterioration and destruction of the plant through a want of [illegible] ... The paper will be concluded by a summary of general deductions with reference to this increasingly valuable article of commerce.

I.—General Account of the Plant.

[illegible]

Botanical Classification.—[illegible]

Its appearance and growth.—[illegible]

The Awnless.—[illegible]

Early delivery.—*Period of growth.*—The young seedling is very delicate and easily killed by late frosts. [illegible]

Climate.—[illegible]

Inland Districts compared with Coast Lands.—[illegible]

Soil.—Esparto is sometimes found in a determinate stony soil—sometimes it sandy. It prefers lime and chalk, and never requires perfection in clay. [illegible]

Cordillo.—[illegible]

The Esparto Zone.—[illegible]

Principal Districts.—The esparto proper, so to speak, is indigenous to Spain, and is found in the provinces of Guadalajara, Toledo, Ciudad Real, Albacete, Cordova, Jaen, Granada, Almeria, Murcia, Alicante, Valencia and Baleares. [illegible]

II.—Time and Mode of Harvesting Esparto.

July the Earliest Time.—[illegible]

Operation of Pulling the Leaves.—[illegible]

Various Methods.—[illegible]

Dry Weather Essential.—[illegible]

(To be Continued.)

Advertisements.

Bargh, Warren & Co.

Paper Warehouse

DEALERS IN

PAPER

AND

Paper Materials

OF ALL KINDS,

No. 16 South Sixth St.

PHILADELPHIA.

MACHINERY FOR SALE.

ONE 60-inch MOULD, 36 inches diameter. [illegible]

JAMES F. PORTER,
No. 69 Duane St., New York.

Established 1856.

PAPER STOCK.

OFFICE OF

TAYLOR & DARROW

7 & 9 ELM STREET,

New York, June, 1872.

Having largely increased our sources of supply, we are enabled to offer Paper-Makers the best assortment of PAPERS for Paper Stock attainable in the United States, composed of the following than can ... in large quantities:

X.C.C.—Office cuttings, all papers.
X.C.— " " muslin-lined.
B.B.—Blank Book shavings.
M.—Perfectly pure unsized shavings.
W.M.—White unsized shavings, unprinted thin.
W.S.—White unsized shavings, fine quality.
X.C.S.—Extra colored shavings.
No. 1. S.S.I.—High grade folded sheets, for perfections.
S.S.I.—Good folded sheets, imperfections.
L.B.—Light and crumpled.
B.—Crumpled and smaller.
P.—Dirty Imperfections, prices.
P.M.—Pure manilas.
B.M.—Bagging manilas.

Selling nothing but our own packing, we guarantee satisfaction.

Prices upon application.

Respectfully, &c.,

TAYLOR & DARROW,
7 & 9 Elm Street, New York.

REMOVAL.

R. B. BRIGGS & CO.

HAVE REMOVED TO

Nos. 68, 70 & 72 Centre St.,

Cor. of Worth St. NEW YORK.

Having increased facilities in all branches of the business, orders from Paper Makers for any grade of stock will be filled with promptness.

J. BAIRD, SONS & CO.

IMPORTERS AND DEALERS IN

ITALIAN MARBLE

AND

RAGS,

214 South 24th St.

PHILADELPHIA, PA.

R. B. BRIGGS & CO.

Nos. 68, 70 & 72 Centre St.,

Cor. of Worth St. NEW YORK

DEALERS IN

FOREIGN and DOMESTIC

PAPER STOCK.

ALL GRADES OF FOREIGN AND DOMESTIC

RAGS,
PAPERS,
ROPE, and
BAGGING,
For Sale.

PERKINS & GOODWIN,

COMMISSION

Paper Warehouse,

IMPORTERS AND DEALERS IN

PAPER MAKER'S SUPPLIES OF ALL KINDS.

SPECIALTIES IN PAPER,

Book & Straw Print.

84 Duane Street,

Three doors east of Broadway.

NEW YORK.

SOMETHING NEW IN PAPER MACHINERY.

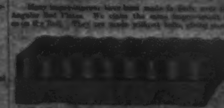
TAYLOR & BRIGHTMAN'S PATENT

Corrugated Engine Roll & Bed Plate.

It is a well known fact with all paper manufacturers, that there has been no improvement made in Paper Rag Engine Rolls, since they first came into use, about the year 1750. After a series of experiments, we have perfected an Engine Roll and Bed, that has many advantages and improvements over the ordinary Engine with straight Bars, some of which we will enumerate.

MORE CAPACITY AND BEATING SURFACE. TAKES LESS POWER. MORE STRENGTH ... DOES NOT CLOG THE STUFF ... [illegible] ... CAN BE ATTACHED TO THE OLD ENGINES IN A FEW HOURS.

Many improvements have been made in Beds, over the old Plate ... Angular Bed Plates. We claim the same improvement on the Bed Plate ... as in the Roll. They are made without bolts, giving more depth of steel ... [illegible]



[illegible]

TAYLOR & BRIGHTMAN, Cleveland, Ohio.

BRAUTIGAM & WATSON,

(SUCCESSORS TO WHITE, SHEFFIELD & CO.)

IMPORTERS OF

Paper-Makers' Stock & Materials

AGENTS FOR

WHITEHEAD'S FELTINGS;

POCHIN'S PATENT ALUMINOUS CAKE;

CURTIUS' ULTRAMARINE

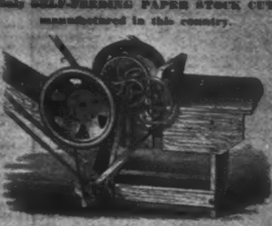
DEALERS IN

Foreign and Domestic Rags.

63 & 65 BEEKMAN STREET,

New York.

The Only SELF-FEEDING PAPER STOCK CUTTER manufactured in this country.



REUBEN DANIEL'S PATENT SELF-FEEDING

PAPER STOCK CUTTERS.

WARRANTED SUPERIOR TO ANY OTHERS NOW IN USE IN THE UNITED STATES. WE WARRANT THEM NOT TO BREAK IN CUTTING ANY KIND OF PAPER STOCK.

[illegible]

	Weight.	Price.
No. 2 RAG AND ROPE CUTTERS,	1800	$800
No. 3 ROPE KNOT CUTTER,	1000	285
No. 5 STRAW PAPER STOCK CUTTER,	900	175
No. 4 WOOLEN RAG CUTTER,	750	125

[illegible]

DANIELS MACHINE CO., Manufacturers,

Woodstock, Vermont.

[illegible]

WM. RUSSELL & SON,	Belfast, Me.
D. HUNTER & CO.,	North Bennington, Vt.
S. D. WARREN,	Boston, Mass.
FRANKLIN PAPER CO.,	Holyoke, Mass.
SMITH PAPER CO.,	Lee, Mass.
SEYMOUR PAPER CO.,	Windsor Locks, Conn.
BUCKLEY, DUNTON & CO.,	New York.
JESSUP & MOORE,	Philadelphia, Pa.

[illegible]

SHERIDAN'S

Patent Sliding-Knife

PAPER CUTTER,

FOR

Paper Makers, Printers,

BLANK BOOK MANUFACTURERS,

[illegible]

E. R. & T. W. SHERIDAN,

[illegible], New York.

WM. KELLY & SON,

[illegible]

COTTON and WOOLEN

RAGS,

Paper Makers' Stock,

Shoddies, &c.

66 & 68 SHERIFF ST.

[illegible] *New York.*

HINRICH FETT & SOHNE,

HAMBURG.

SQUARE & LONG BALES

HAMBURG PACKING.

HUGO FETT & CO.

48 New St., New York.

Goodwin, Cobb & Co.

COMMISSION

Paper Warehouse,

IMPORTERS AND DEALERS IN

Bleaching Powders,

Soda Ash,

ULTRAMARINE,

RAGS,

Gunny and Kentucky Bagging,

MANILLA & HEMP ROPE

AND MANUFACTURERS' MATERIALS OF EVERY DESCRIPTION.

BOOK, NEWS,

AND

Printing Paper

MADE TO ORDER AT SHORTEST NOTICE.

16 & 18 READE ST.

New York.

Established 18[illegible]

JAMES F. PORTER,

Paper Manufacturer,

AND DEALER IN

PAPER

Paper Makers' Stock,

AND

Supplies of every Description

WAREHOUSE:

69 Duane Street,

NEW YORK.

JUTE BUTTS

A

SPECIALTY.

H. C. Hulbert & Co.

[illegible]

Paper Makers' Materials.

AGENTS FOR

Best English Feltings,

ULTRAMARINE,

PEARL HARDENING, &c.,

FOREIGN & DOMESTIC

RAGS,

ALL GRADES OF

Paper Stock.

BREGS FOR

BOOK PAPER

OF VARIOUS QUALITIES

MADE AT SHORTEST NOTICE

No. 18 BEEKMAN ST,

NEW YORK.

Holyoke Machine Co.

MANUFACTURERS OF THE

AMERICAN TURBINE

Water Wheel,

PAPER MACHINERY,

Litchfield Pumps and Hydraulic Presses,

Size Pumps, Shafting, and

Mill Work Generally.

Holyoke, Mass.

IRON CASTINGS OF ALL KINDS.

WANTED

A SECOND-HAND

GAVIT CUTTER

Thirty-six inch, with three Beds, and Frame complete. Must be in good order, and at low price. Address,

JAMES F. PORTER,
No. 69 Duane St., New York.

Daily Capacity 110,000 lbs.

Mills at { East Walpole, Mass. / West Groton, Mass.

Established 1843

Hollingsworth & Vose Company

OFFICES: 141 MILK STREET, BOSTON, MASS., U. S. A.

Manufacturers of

ROPE AND JUTE MANILA PAPERS

for Seventy-Nine Years

we have studied and developed the manufacture of paper from Manila fibres. This enables us to offer a service that will greatly assist in the working out of your paper problems especially where Rope or Jute content is required. The Hollingsworth & Vose Company's Department of Engineering Methods is at your disposal.

Rope and Jute Tag Stock	*Saturating Paper*
Stencil Paper	*Duplex Paper*
Envelope Rope and Jute	*Pattern Paper*
Fourdrinier and Cylinder Sand	*Red Rope Paper*
Electric Insulating Paper	*Music Roll Paper*

Rope and Jute Coating Stock

Manufacturers of **IronTag** *Tag Stock of Quality*

U. S. Patent granted in 1843 to J. M. & L. Hollingsworth for process making paper from Manila Fibre

prospectus have been the guiding stars of the PAPER TRADE JOURNAL in its fifty years of work, and the position which it holds in the trade demonstrated beyond question the firm foundation upon which it was based and the fidelity with which those principles have been followed through all these years.

Quotations of Fifty Years Ago

Upon the second page there was a full line of market quotations. As an indication of the prices then in force, it may be stated that fine No. 1 white shirt cuttings were quoted at 10½ to 11 cents; city whites, at 7¾ to 8 cents; No. 2 whites, 5¼ to 6 cents; city seconds, 2⅜ to 3½ cents; manilla rope, 5¼ to 5½ cents; gunny bagging, 3¾ to 4 cents; jute butts, 3¼ to 3½ cents; all paper white collar cuttings, 8¼ to 8½ cents; No. 1 white ordinary shavings, 7½ to 7¾ cents; No. 1 soft white shavings, 7¼ to 7½ cents; best folded sheets, No. 1 imperfections, 6 to 6¼ cents; No. 1 book stock, 4¾ to 5 cents; commons, 1 to 1⅛ cents.

In English rags, cotton cuttings were quoted at 9¼ to 10 cents; out shots, 5¾ to 6¼ cents; seconds, 5 to 5¼ cents; checks and blues, 4½ to 5½ cents; light fustians, 4¾ to 5 cents; dark fustians, 3½ to 3¾ cents; No. 1 gunny, 3⅝ cents; manilla rope, 5¼ to 5½ cents.

On Hamburg rags the quotations were: SPFFFs, 8⅜ to 8¾ cents; SPFFs, 7 to 7½ cents; SPFs, 6 cents; extra fine blue linens, light colors, 6 to 6½ cents; CSPFFFs, 7¾ to 8 cents; CSPFFs, 6 to 6¼ cents; CSPFs, 4½ to 4¾ cents; extra fine blue cottons, light colors, 5½ to 6 cents.

Leghorn rags were quoted at 7¾ to 8½ cents for PPs, 6½ to 6¾ cents for SSs, 4½ to 5 cents for RRs, 7½ to 7¾ cents for Ps, 5¼ to 5 cents for Ss, 4 to 4½ cents for Ts.

Upon the third page was a directory, which is yet one of the features of the paper; a synopsis of recent patents granted to workers in the paper industry, importations of paper, paper stock and papermakers' supplies, and a medley of general news.

The First Advertisers

The fourth page was almost wholly devoted to advertisements. Among the advertisers in this first number were: Taylor & Darrow; R. B. Briggs & Co.; Perkins & Goodwin, the style of which house is now the Perkins, Goodwin Company; Brautigam & Watson, and H. C. Hulbert & Co. E. R. & T. W. Sheridan had an illustrated advertisement showing their patent sliding knife paper cutter, while the Daniels Machine Company, of Woodstock, Vt., of which Reuben Daniels was proprietor, illustrated and described, in the largest announcement on the page, "the only self-feeding paper-stock cutter manufactured in this country." Another machinery advertisement was that of Taylor & Brightman, Cleveland, Ohio, who manufactured a patent corrugated engine roll and bedplate, and yet another was the Holyoke Machine Company manufacturer of the "American" turbine water wheel and a line of paper-mill machinery.

LESLIE R. PALMER
PRESIDENT OF THE LOCKWOOD TRADE JOURNAL CO.

Besides these there were display announcements by James F. Porter, 69 Duane street; William Kelley & Sons, 66 Sheriff street; Hugo Fett & Co., importers of Hamburg rags, 48 New street; Bargh, Warren & Co., paper dealers, 16 South Sixteenth street, Philadelphia, and J. Baird & Co., importers of Italian rags, Philadelphia.

In the directory column referred to were announcements of Brautigam & Watson, then at 63 Beekman street; Bulkley, Dunton & Co., then at 74 John street, and now at 75 Duane street; Goodwin, Cobb & Co., 1 Reade street; Harris Brothers & Co., 49 John street; C. B. Hewitt & Bro., then at 48 Beekman street, and now at 12 Ferry street; H. C. Hulbert & Co., then at 13 Beekman street; G. W. Millar, then at 10 Spruce street, and now at 284 Lafayette street as Geo. W. Millar & Co.; John J. Murphy, at 47 John street; the Perkins & Goodwin Company, then at 84 Duane street, now at 33 W. Forty-second street; Platner, Miller & Co., at 32 Beekman street; M. Plummer & Co., at 161 William street; James F. Porter, 69 Duane street; J. Q. Preble & Co., 77 White street; John Priestly & Co., 33 Beekman street; Vernon Brothers & Co., then at 65 Duane street, now at 22 Reade street, and Wilkinson Brothers & Co., 72 Duane street, now at 419 Broome street. These firms' cards all appeared under the head of "Paper and Paper Makers' Supplies."

The straw-wrapping trade was represented by Cornell & Cave, at 172 Fulton street; Hedges & Morse, at 180 Fulton street, and D. D. Tomkins, who was in Barclay street; while among the papermakers in the directory were Ira Beebe & Co., 27 Beekman street, now at 132 Nassau street; N. S. Briggs, 41 Barclay street; John T. Hoag, 27 Chatham street, and H. A. Philip & Co., 109 Reade street. The paper-stock men were represented by R. B. Briggs & Co., C. H. Buckley, Hugo Fett & Co., William Kelley & Sons, Owen Keenan & Co., P. Kildea, Charles P. Spaulding, John C. Stockwell and E. W. Taylor & Co. Allen Brothers, Sandy Hill, were the sole representatives of the hanging paper interests. Bradner Smith & Co., the Claremont Manufacturing Company, the Cleveland Paper Company, Davis & Moore, McIlwaine & Co., the Rockland Company, and the Stewart Paper Company all had cards; while in manilla paper there were Dillingham & Co., C. H. Dexter & Son, Haumen & Fales, Howland & Miller, George S. Sheldon & Co., and Oliver Woodworth. The papermakers who were represented were Morrison, Bare & Co., the Star Paper Company, George Robertson & Son, and John Robertson.

Enjoyed Prosperity From Beginning

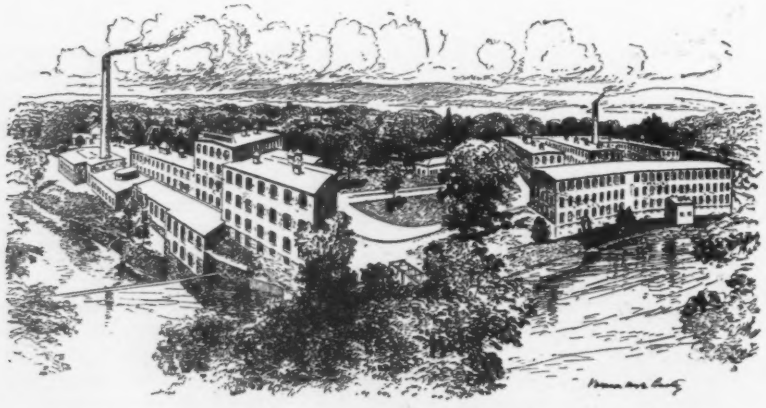
The price of the paper was 10 cents, which price has always been maintained. The journal filled a need and it prospered from the start. It was liberally encouraged by the members of the industry, both in the way of subscriptions and advertising. A stationers' department and a book-makers' department were early established and these developed to such an extent that the former was expanded, April

Over 60 Years of Leadership in the Ledger Paper Field

BYRON WESTON COMPANY MILLS, 1863

PAST history is of value only in the light of present performance. The unrivaled reputation of Byron Weston Co.'s papers was established over half a century ago, and has been uniformly maintained through all the ups and downs of paper-making history.

Any paper mill can make good paper some times; but the crucial test is to make good paper at all times. As a matter of fact, any series of tests will demonstrate that Byron Weston Co.'s papers are even better today than at any past period since Mr. Byron Weston began operations in 1863.



BYRON WESTON COMPANY MILLS, 1922

BYRON WESTON CO.,

DALTON, MASS.

6, 1874, into THE AMERICAN STATIONER, now THE AMERICAN STATIONER AND OFFICE OUTFITTER, a weekly, devoted to the interests of the stationery trade, and the latter in 1885 into THE AMERICAN BOOKMAKER, a monthly, devoted to printing and bookmaking.

From 14 Park Place the office was removed to 36 Beekman street, then directly in the heart of the paper district, but the rapid growth of the business soon caused a removal to 74 Duane street. In 1883 larger quarters were again sought at 126-128 Duane street, and cramped quarters necessarily led to the removal in 1895 to the corner of Bleecker street and West Broadway, and in 1899 to 150 Nassau street. In 1916, influenced again by the need for larger quarters and the strong uptown trend, which had already caused the removal of numerous important paper houses to the district around the Grand Central Station, the office was located at 10 East 39th street, in one of the most easily accessible locations in the city, where it has since continued.

Lockwood's Directory

Lockwood's Directory of the Paper and Allied Trades was published for the first time in 1873. Until that time no mill reports had been published that were at all reliable, even the government trade reports not being thoroughly trustworthy. The preface to the first edition said:

"In approaching manufacturers for the necessary information to compile this directory, the few rebuffs received will not prevent the publisher from mentioning with pleasure the general courtesy that has always been shown him by the trade in all sections of the country, and he desires to express his hearty thanks for the complete manner in which his blanks sent to different parties have, in the great majority of cases, been filled out. The confidence thus shown in putting in his possession information of many important details of their business is fully appreciated by him, and he pledges himself, as from the beginning, not to use such information except in the general manner it now appears."

Directory an Immediate Success

The directory was an immediate success, those wishing to do business with pulp and paper mills at once recognizing the advantages its pages offered them and these advantages have been increasingly recognized with the passing years.

The first edition of the directory shows that in 1872 there were in the United States 820 mills, 812 of which were operated by 765 concerns, while eight were idle. In these mills there were 299 Fourdriniers 690 cylinder machines and 3,296 engines producing 317,637 tons annually, valued at $66,505,825. The value of the plants was estimated at $35,564,500. The reports showed that there were 13,427 male and 7,700 female adults and 922 children engaged in the industry.

In examining the files it will be observed that during the first years of the existence of the directory the industry was confined more especially to New England, and the Middle States. Gradually, however, it spread to Canada and the Middle West, later to the Pacific Coast, while just at present there is a noticeable expansion in the number of mills in the South, and a pulp mill has been established in Alaska. The 1922 editions of the directory shows that there are now in the industry in the United States and Canada 991 Fourdrinier and 839 cylinder machines.

The great growth of the industry, however, is more clearly indicated by the comparative table of production shown below. The figures for the years 1872 and 1897 were compiled from the directory, while those for 1921 were issued by the Federal Trade Commission. The figures for the former years are daily while those for the latter are yearly production.

	1872 Tons	1897 Tons
Writing	76	414
Book and news	305	3,490
Straw print	47	....
Hanging	29	83
Manilla	130	1,278
Straw wrapping	132	328
Wrapping	115	435
Strawboards	74	802
Binders' board	33	113
Leather board	10	56
Wood pulp	66	3,224

	1922 Tons
News print	1,226,189
Standard news	1,130,943
Book paper	725,992
Paperboard	1,664,931
Boxboard	1,122,336
Fine paper	242,485
Wrapping paper	651,605
Bag paper	130,863
Hanging paper	69,725
Tissue paper	148,142
Felt and building paper	286,111
Other grades	210,274
All grades	5,356,317
Pulp (all grades)	2,801,438

The Mills of Fifty Years Ago

Paging through the first edition it will be seen that the following concerns, still in operation, were listed in the mill reports:

In Connecticut there were the Tait & Sons Paper Company, Bridgeport; East Hartford Manufacturing Company, Burnside; Howard C. Brown Estate, East Hampton; William Foulds & Co., Inc., Manchester; Robertson Paper Company, Montville; S. Y. Beach Paper Company, Seymour; Case Brothers, Inc., Rogers Paper Manufacturing Company, South Manchester; Joseph Parker & Son Company, Westville; C. H. Dexter & Sons, Inc., Windsor Locks. In Delaware—Curtis & Brother, Inc., Newark; Jessup & Moore Paper Company, Wilmington. In Indiana—Ferdinand Funke's Sons, Evansville. In Maine—Forest Paper Company, Yarmouth. In Maryland—Antietam Paper Company, Hagerstown. In Massachusetts—Union Mills Company, Bancroft; S. D. Warren Company, Tileston & Hollingsworth, Hollingsworth & Vose Company, Boston; Z. & W. M. Crane, Byron Weston Company, Dalton; Bird & Son, Inc., East Walpole; Crocker-Burbank & Co. Ass'n; Fitchburg Paper Company, George W. Wheelwright Paper Company, Fitchburg; Franklin Paper Company, Parsons Paper Company, Valley Paper Company, Whiting Paper Company, Holyoke; Munroe Paper Company, Lawrence; Smith Paper Company, Lee; Southworth Company, Worthy Paper Company Association, Mittineague; C. F. Crehore & Son, Newton Lower Falls; L. Lincoln & Co., North Dighton; Chapin & Gould Paper Company, Russell; Carew Manufacturing Company, Hampshire Paper Company, South Hadley Falls; Keith Paper Company, Turners Falls; John Roberts & Son Company, Waltham. In Michigan—Peninsular Paper Company, Ypsilanti. In New Hampshire—G. A. Robertson & Co., Fiske Paper Company, Inc., Hinsdale; Contoocook Valley Paper Company, West Henniker. In New Jersey—E. H. Davey Company, Bloomfield; W. O. Davey & Sons, Jersey City. In New York—Phœnix Paper Company, Battenville; Stevens & Thompson, North Hoosic; W. H. Fox & Sons, Penn Yan; Pemble Mills, Stillwater; Knowlton Brothers, Inc., Taggart Brothers' Company, Watertown. In Ohio—Thomas Phillips Company, Akron; Adams Bag Company, Chagrin Falls; Beckett Paper Company, Hamilton; W. B. Oglesby Paper Company, Middletown. In Pennsylvania—Estate of Wilson Wylse, Chesterville; Willis B. Palmer, Coatsville; John Lang Paper Company, 24th and Vine streets, Philadelphia; D. M. Bare Paper Company, Roaring Springs; P. H. Glatfelter Company, Spring Grove. In Vermont—William H. Vinton & Sons,

MUNROE FELT & PAPER CO.

Mills at Lawrence, Mass.

Office: 79 Summer Street, BOSTON

MANUFACTURERS OF

PARCEL POST KRAFT

For High Class Wrapping, Bags, Envelopes, etc.
Tough, Elastic, Pliable, Uniform
Free from acid and adulterants

Made from 100% Pure Sulphate Pulp

MAKERS ALSO OF

Blanks, Carpet Linings, Cheviots, Crimps and other Specialties

C. W. RANTOUL CO.

33 West 42nd Street : : : : New York Agents

Brattleboro; William Robertson Sons, Putney. In Virginia—Richmond Paper Manufacturing Company, Richmond. In West Virginia—The Harvey Paper Company, Wellsburg. In Wisconsin—Beloit Boxboard Company, Beloit; Kimberly-Clark Company, Neenah. In Canada—John Fisher & Son, Ltd., Dundas, Ont.; Riordon Company, Ltd., Montreal, Que.

The growth in the appreciation of the value of the directory by the trade is evidenced by the fact that while the first edition published in 1873 contained only 212 pages, the current edition of 1922 contained 946 pages.

Howard Lockwood

Howard Lockwood, the founder of the PAPER TRADE JOURNAL, was born at White Plains, Westchester County, N. Y., on March 9, 1846. He was the son of General Munson I. Lockwood, and was a lineal descendant of Robert Lockwood, first of the name in the United States, who was an emigrant from England in 1630, and who settled at Watertown, Mass. The descendants of Robert Lockwood took an active part in the Colonial and Revolutionary wars, twenty-three of them having participated in the former conflict, and nearly 200 of them in the latter. On his mother's side Mr. Lockwood was descended from Nicholas Delaplaine, a distinguished Huguenot, who came to America and settled on Manhattan Island, where he died in 1790.

In 1865, Mr. Lockwood came to New York and secured employment in a Duane street paper house. He applied himself to his new duties with industry and intelligence, and soon acquired a very thorough knowledge of the business, together with an understanding of the scope, extent and processes of paper manufacture.

In the spring of 1872, believing that there existed the necessity for a representative paper in the paper trade, he established the PAPER TRADE JOURNAL. There was a great deal of opposition to the proposition to establish such a paper, many of those engaged in the making and selling of paper expressing the belief that there would be entirely too much news furnished to people, and that readers would come into the possession of information which in those days of comparatively slow communication was held by only the few. These reasons, presented to him in forcible shape, did not deter Mr. Lockwood in the slightest. On the contrary, they emphasized the necessity for such a paper.

He began the publication in a modest way, bringing it out at first as a semi-monthly of four pages. It was very evident from the start that he intended to print all the news which he could obtain, and to print it in a dignified, forceful style, which would commend his undertaking to every serious, sensible man whose commendation was worth having. That his judgment was well founded and that he was right and his critics wrong as to the matter, has been settled emphatically by the position which the JOURNAL has always occupied as the leader since its first issue. Mr. Lockwood had, of course, a very wide acquaintance in the trade, and his opinions, which were well matured before they were expressed, were respected, even by those who disagreed with him. In the conduct of the JOURNAL he was eminently fair, and in considering the line of policy to be pursued as to any given matter, he held firmly and tenaciously to his original determination to print a paper which should contain not only all the news but which should be a reflection of the progress of the entire trade in all its departments from week to week. He believed that the editorial and news end of the paper should be conducted entirely uninfluenced by the business office. Not only was that his belief, but it was his practice. If the true story of an event of sufficient trade interest to warrant publication was presented to him, he always and invariably insisted that it be printed for the benefit of the entire trade, without any regard to whether those whom it affected were or were not represented in the advertising columns of the JOURNAL.

He founded the JOURNAL as an independent trade paper, and he never deviated a straw from that line of policy. He was not trained in the newspaper business, but he possessed that tact and judgment which led him in the right direction and which made of his work the success that it was.

He had an abhorrence of shams, particularly of those in the trade, and he neglected no opportunity to expose them. In the course of its fifty years of successful life, the JOURNAL has had occasion in many instances to attack trade shams and it has never hesitated to do its whole duty in that respect.

Mr. Lockwood took a deep interest in everything which was connected with the paper and allied trades, and always, both by word and act, aided every movement which had for its object the benefiting of those engaged in any of these lines.

Col. Charles H. Jones Buys the Journal

Following Mr. Lockwood's death, the business was continued by the Howard Lockwood Publishing Company. The business was sold in 1899 to Col. Charles H. Jones, who continued the business under the style of the Lockwood Trade Journal Company. Col. Jones was prominent in national politics and was one of the best-known newspaper men in the country. He had for some time been associated with Joseph Pulitzer in the publication of the New York *World*, of which he was managing editor. He was induced by Mr. Pulitzer to leave that position and to go to St. Louis to take charge of the St. Louis *Post-Dispatch*, as editor and general manager, which position he held until 1896, when he retired from daily journalism because of ill-health.

When he bought the Lockwood publications in the spring of 1899, he made his brother, the late George W. Jones, manager, although he gave them much personal attention just at first and continued as careful a supervision as his health would permit until his death in 1913. On the acquisition of the properties his exceptional genius as a publisher became immediately manifest in many improvements, among them the change to the present form of the PAPER TRADE JOURNAL. These improvements have been important factors in keeping the several publications of the Lockwood Trade Journal Company the leaders in their respective fields.

Leslie R. Palmer Acquires Control

After Col. Jones's death the controlling stock in the Lockwood Trade Journal Company was acquired by Leslie R. Palmer. Mr. Palmer is a member of the Palmer family which came to this country from England in 1620, settling in the State of Connecticut. Mr. Palmer, however, was born at Thompson Ridge, Orange County, N. Y., February 20, 1877. He graduated from the Walden High School in 1892, and from the Ithaca High School the following year. In the fall of 1893, he entered Cornell University with a scholarship and graduated in 1897 with the degrees of Ph.B. and LL.B.

Mr. Palmer was admitted to the Bar in 1897 and practiced law in New York City from this date until 1912, specializing in corporation and real estate law. During this period he also became interested in real estate operations in Manhattan. In 1901 he was elected president of the Croton Docks Company, and his activities having broadened along many lines, he became president of the First National Bank of Croton-on-Hudson in 1908. The following year he was elected vice-president of the Brunswick Company. In 1913 he became president of the Commonwealth Security and Mortgage Company, and in 1915 president of the Lockwood Trade Journal Company.

Mr. Palmer was one of the original directors of the Federal Reserve Bank of New York, having been re-elected at the end of his first term of directorship, and again re-elected in 1918, serving as a class "B" director. He is president of the First National Bank of Yonkers, president of the First National Bank of Hastings, and chairman of the Board of Directors of Ossining.

Mr. Palmer has also been connected with various building companies which have been responsible for the erection of many of the large buildings in New York City, among which are the Waldorf Building, Brunswick Building, Murray Hill Lofts and others.

George R. Wallace, Pres. & Treas.

Directors.
George R. Wallace
George R. Wallace, Jr. Frederick Wallace

Fitchburg Paper Company

FITCHBURG, MASS.

Founded in 1864 by Rodney Wallace

In continuous operation by
the same interest for 58 years

CAPACITY

1864—One machine (widest trimmed sheet 60″) 900 tons per year

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1922—Seven machines (widest trimmed sheet 145″) 35,000 tons per year

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Product for 58 Years

Book, Coating Papers, Special Papers for Wall Paper Manufacturers

Half Century of Paper Making in the U. S. A.

Industry Has Shown Marvellous Growth in the Past Fifty Years—Production of All Varieties of Pulp and Paper Have Greatly Increased—Paper Machines Which When the Paper Trade Journal Was Founded Ran Only Several Hundred Feet Per Minute Have Now in Several Instances Reached a Speed of 1,000 Feet Per Minute—War Period a Trying One—Bright Future for the Industry.

Written Especially for the Fiftieth Anniversary Number by Lyman Horace Weeks

The half century ending in 1922 has been witness of many marvelous changes and an astounding expansion in paper maufacturing in the United States, alike from the producing, the financial, and the distributing points of view. When the first number of THE PAPER TRADE JOURNAL—whose fiftieth anniversary we are now observing—came out in May, 1872, the industry was not, it is true, exactly in its infancy, but, compared with what it is in 1922, it had then not much more than attained to the status of young manhood though with rich promise of growth to a solid maturity. It has been in existence from 1690 and during that period of one hundred and eighty-two years it had developed slowly and at times painfully and still remained for the most part an occupation of locality and not a country-wide enterprise. Machines which have revolutionized paper making transforming it from hand work to mechanical processes had been in use for some fifty years but had not yet fully succeeded in dominating the industry.

The first considerable expansion and the substantial change from hand to machine methods, by which that expansion was made possible came practically after the American Civil War. Of course it is not overlooked that the beating engine, or Hollander, and after that the Jordan improvement were in American mills at the beginning of the nineteenth century; that the cylinder came into existence before 1820; that the Fourdrinier was introduced prior to 1830; that other mechanical devices were known before the middle of the last century had passed and that the great wood-pulp era dated, in its incipiency, from soon after 1850. These things were no longer experimental in 1872, but they were yet far from their full development as machines and methods, and far from meeting all the expectations that were held regarding them: those results were to ripen in the ensuing years and paper-manufacturing history of the last fifty years has been a record of them.

1872 and 1922

The twenty-fifth anniversary number of THE PAPER TRADE JOURNAL, October 19, 1897, portrayed the industry as it existed in 1872 and thoroughly reviewed, in a notable collection of special articles, what had been achieved during the twenty-five years that had immediately followed. No better conspectus of that period can be drawn than by reverting to the pages in that special issue. In news matter, 1872 was singularly, in many respects, like 1922. The national House of Representatives was engaged in its perennial pursuit of the tariff, discussing rates of duty on paper, books, wood pulp, sal-soda, soda ash and other raw materials and finished products. Building of new mills in Maine, Massachusetts, New York and other centers of paper-manufacturing were announced and even in the far West. The ever-present subject of raw material was under consideration then as now and the customary successful experiments with rice, grass, esparto, pine and other fibers were reported. Paper clothing was described as a novelty and milk pans, cups, washbowls and other articles of common use were being made from paper. The price of domestic rags ranged from 2⅜ to 11 cents, Manila rope from 5¼ to 5½ cents, jute butts from 3¼ to 3½ cents. In New York City, as the advertisements showed, the paper trade was centered in Duane, New, Beekman, John, Reade, Spruce, Fulton, Barclay and Chatham streets.

Men who had been in the forefront of the up-building of the industry after the Civil War were most of them still living in 1897. They had full knowledge of all that had gone on in their life-time and abundant and rich recollections of their experiences. Their contributions, which, in text and illustrations, were the feature of that special issue, covered the history of paper-making, paper machinery and paper-selling, not only for the period of that quarter of a century, but much that was prior to that date. A mere enumeration of what they wrote reveals, in a large degree, the scope of the industry as it then existed and the names of many who had been and still were prominently identified with it. This prelude briefly will serve to bring us down to 1897, half the life-time of THE PAPER TRADE JOURNAL. It is not only a fitting introduction but it is the complete and essential record of half of this half century period.

Thomas H. Savery, vice-president of the Pusey & Jones Company, wrote on the development of the American paper-making machine; the Hon. George A. Bagley, of the Bagley & Sewall Company, who made the first American pulp grinder, told about that bit of equipment; Guyon Miller, of the Downington Manufacturing Company, explained the evolution of the old-time stamps and its successor, the Hollander, into the modern beating engine; William Stanier, Cornelius Van Houten and William Buchanan contributed recollections of the making of the first American Fourdrinier wires. The story of the introduction of wood pulp into American mills was vividly recalled by A. Pagenstecher and the Hon. Wellington Smith concerning groundwood; Benjamin C. Tilghman and George N. Fletcher about sulphite fiber; Hugh Burgess about soda fiber, and Thomas Duncan about the use of wood pulp for fine papers. Other contributions were on electrical power by the Hon. Arthur C. Hastings of Niagara Falls; the American Paper and Pulp Association by Chester W. Lyman; the exporting of paper by W. H. Parsons, Jr.; surface coated papers by Ethan Allen Doty; wood-pulp boards by Charles D. Brown; strawboards by Frank Whiteside; "slow-burning" building construction by Fremont W. Spicer; tissue paper by George W. Thompson; paper bags by F. W. Leinbach; American endless felts by D. M. Fuller; straw wrapping paper by John D. Tompkins; blotting paper by W. H. Eaton, and various uses for paper and pulp by George Damon Rice.

Papers on the planting and growth of the manufacturing in particular localities were by J. A. Kimberly of Kimberly & Clark in the Fox River Valley; Oscar S. Greenleaf of the Holyoke Paper Company; A. H. Chatfield of Cincinnati and elsewhere in Ohio; Col. J. C. Morgan of Niagara Falls; W. H. Nixon of Philadelphia; J. W. Butler of Chicago; George W. Knowlton of the Black River, N. Y., District; Benjamin F. Reist of the Miami Valley, and Thomas Howard of Utah. Of old-time annals were the stories

Z. & W. M. CRANE

MAKERS OF

CORRESPONDENCE

AND

WEDDING PAPERS

AND

PASTED BOARDS

DALTON - MASS.

of the Willcox Ivy Mill in Pennsylvania by Joseph Willcox; the Rittenhouse Mill in Philadelphia by Dr. A. Rittenhouse; the Gilpin Mill on the Brandywine by Elizabeth Montgomery; the Crane Mills at Dalton, Mass.; the first American mould by Horace W. Sellers; old vat-men by Byron Weston; working in old-time mills by Edward Conley; before and during the Civil War by H. H. Porter; reminiscences by James F. Hobart and about rags by Henry Atterbury.

The present significance of most of this "table of contents" is that, in large measure, it covered the development of modern paper manufacturing under changed conditions in the great day of machinery; that it was "first-hand" information from masters in the art who had played influential parts in that which they described; and that, with few exceptions, the writers have since passed to the great beyond. Surely there were giants in those days and their figures loom large and impressive whenever any retrospect of the industry is undertaken. That was the time of individualism and those men did not simply manage the mills which they owned: in a full sense they were really the mills themselves. They stamped the industry clearly with their personalities and their names are something more than mere memories. We may thus recall Thomas H. Savery, William Stanier, William Buchanan, Byron Weston, Wellington Smith, J. A. Kimberly, George A. Bagley, George W. Knowlton, William H. Nixon, Augustus G. Paine, Warner Miller, W. Murray Crane, George C. Sherman, James B. Forsyth, John S. Van Nortwick, O. A. Outerson, John Harding, A. D. Remington, George W. Sisson, Warren Curtis, Charles R. Remington, Charles T. Crocker, William S. Whiting, Charles D. Mead, George A. Whiting, George W. Sherman, Samuel D. Warren, George West, James F. Outerson, George F. Barden, Francis W. McDowell, Morris H. Nixon. The names have been recalled at random and the list might be further extended sadly and regretfully.

Salient Features

Sifted out from the mass of almost infinite weekly monthly and yearly details of the multitudinous activities in the existence of the industry some salient things stand forth most conspicuously during an extended period of ten or twenty-five or fifty years. These are the marvellous growth of the manufacturing as shown in increase of plants and their capacity, in production and in enlargement of exports; the changes in the form of working capital from individual or partnership or comparatively small corporate ownership to consolidations and corporations of large size utilizing invested capital in big amounts; the astounding improvement of machines in size, speed and effectiveness; the always threatening shortage of raw material by the impoverishment of forests in the supply of pulpwood; the controversy with Canada over pulp and pulpwood and its results; the issues of government authority over distribution of supply and prices; the realization of the importance of technical knowledge and training in the advancement and improvement of the industry in its expansion and growing diversity. These, in the most impressive way, constitute the history of the period under consideration. All else becomes, for the most part, merely incidental.

A Quarter of a Century Ago

In the beginning of the quarter of a century that had elapsed since that twenty-fifth anniversary of the PAPER TRADE JOURNAL in 1897, great developments in the industry were foreshadowed. Quoting from *A History of Paper-Manufacturing in the United States*, 1690-1916:

"During the closing years of the last and the opening years of the present century there was remarkable expansion in many ways. Bigger mills were built, bigger and better machinery put into them and improved methods of manufacture introduced. The industry was established in new places and more than ever before, was concentrated in particular localities on large scale. By the prefecting of the woodpulp processes an overwhelming increase in output resulted and a corresponding demand for paper was developed. Also woodpulp made possible the multiplying of the kinds of paper and the manufactures therefrom to an extent that could not have been imagined a half century before. Pulp making became almost an independent branch of the industry, expanding into a business of great dimensions and serving many lines of manufacture quite aside from that of purely paper making. Foreign trade began to be a matter for serious consideration. Exports, which in the past had been almost negligible assumed encouraging proportions."

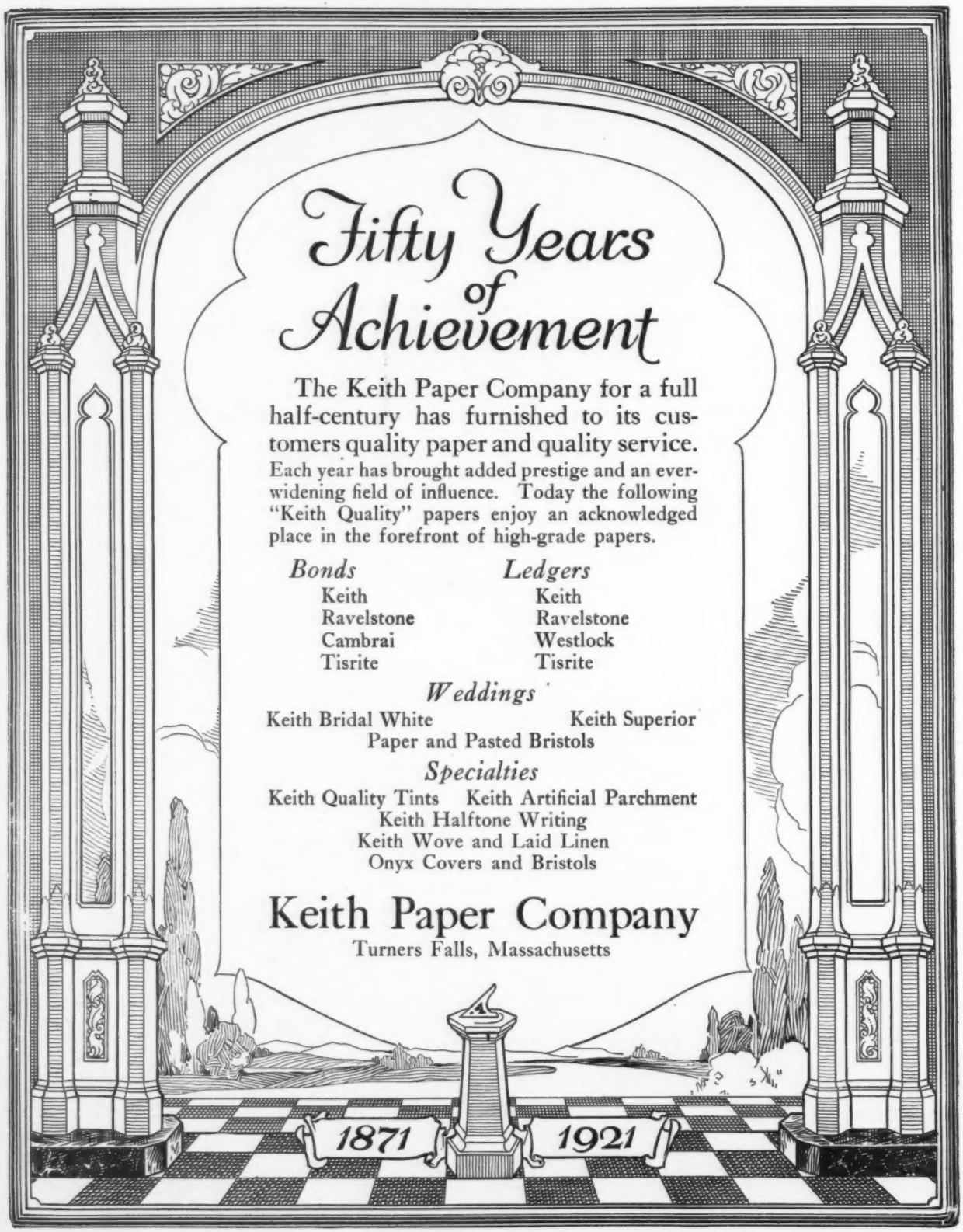
That succinctly portrays the condition of the industry, broadly speaking, twenty-five years ago. Some details, especially in the way of comparison, will make this more clear as pertains to the two quarter centuries, 1872-1897 and 1897-1922.

Some Comparisons

In 1872 there were in the United States eight hundred and twenty mills operated by seven hundred and fifteen different concerns. In these mills were two hundred and ninety-nine Fourdriniers, six hundred and ninety cylinder machines and three thousand two hundred and ninety-six engines. The annual product was 317,637 tons, valued at $66,505,825. The value of the mill plants was estimated at $35,564,500. Workers in the industry were 13,427 men, 7,700 women and 922 children and their annual wages amounted to $9,552,146. In 1899 the census reported seven hundred and sixty-three establishments with a capital of $167,507,713; wage earners 49,646; value of annual product $127,326,162; this was an increase of nearly eighty-seven per cent in capital invested and over sixty per cent in value of annual product during the decade that had then ended. At the same time twenty-nine establishments having a capital of $4,326,629 were reported as standing idle.

In 1889, by the census reports of 1900, seven hundred and sixty-three establishments had a capital of $167,507,713; wage earners, 49,646; value of annual product, $127,326,162; that was an increase of nearly eighty-seven per cent in capital invested and over sixty per cent in the value of annual product as compared with 1889. At the same time twenty-nine establishments having capital of $4,326,629 were reported as idle. Newsprint in rolls amounted to 455,000 tons, valued at $15,775,000; costing on the average $34.62½ per ton and selling for $50 to $60. Book paper amounted to 282,000 tons, valued at $19,467,000 the average cost at the mill being $69.03 per ton. Fine writing amounted to 90,000 tons, valued at $12,223,000 and costing $135.81 per ton. Other figures were: manilla wrapping, 89,000 tons, value $5,930,000; heavy wrapping, 83,000 tons value $4,143,000; straw wrapping, 92,000 tons, value $2,028,000; bogus wood manilla, 204,000 tons, value $9,149,000. In 1904 the establishments numbered seven hundred and sixty-one with capital $277,444,471 and annual production $188,715,189. The average capitalization of the establishments existing in 1890 was $138,412 and in 1904, $364,579; the average production in 1890, $121,629 and in 1904, $247,983; those figures are a striking exhibit of the development of the industry in that period.

At the close of 1909, the thirteenth census report gave the number of establishments as seven hundred and seventy-seven representing a capital invested of $409,348,505 and value of annual production $267,869,000. Compared with 1899 there was a two per cent gain in the number of establishments, a one hundred and forty-four per cent increase in invested capital and a one hundred and ten per cent increase in production. One hundred seventy-eight establishments were located in New York, eighty-eight in Massachusetts, seventy-two in Pennsylvania, fifty-seven in Wisconsin, fifty-one in Connecticut, forty-seven in Ohio and forty-five in Maine. Paper was made to the amount of 4,216,708 tons. News print in rolls amounted to 1,091,017 tons; value $42,807,000; average cost at the mills $39.23½ per ton; selling price at the mills, in same instances $40 to $42 per ton. Book paper, plain


Fifty Years of Achievement
The Keith Paper Company for a full half-century has furnished to its customers quality paper and quality service.
Each year has brought added prestige and an ever-widening field of influence. Today the following "Keith Quality" papers enjoy an acknowledged place in the forefront of high-grade papers.
Bonds
Keith
Ravelstone
Cambrai
Tisrite
Ledgers
Keith
Ravelstone
Westlock
Tisrite
Weddings
Keith Bridal White
Keith Superior Paper and Pasted Bristols
Specialties
Keith Quality Tints
Keith Artificial Parchment
Keith Halftone Writing
Keith Wove and Laid Linen
Onyx Covers and Bristols
Keith Paper Company
Turners Falls, Massachusetts
1871
1921

amounted to 575,000 tons, value $42,846,674; average cost $74.44 per ton; fine writing, 169,125 tons, value $24,966,102 average cost, $147.72 per ton; manilla wrapping, 73,731 tons, value $6,989,436; heavy wrapping 108,561 tons, value $4,380,792; straw wrapping 32,988 tons, value $870,419; bogus manilla 367,932 tons, value $19,777,707; tissue 77,745 tons, value $8,553,654. The tonnage of groundwood and chemical fiber was 1,179,525 in 1899, 1,921,678 in 1904 and 2,495,523 in 1909.

In 1911 a special report of the United States tariff board on pulp and news print paper gave 894 plants as making paper of same kind, their total productive capacity being 5,196,398 tons. Of that total news print and hangings were 1,335,321 tons; wrapping, 1,020,914 tons; board, 1,190,214 tons; book, 786,163 tons and writing, 210,617. In the same report the number of groundwood mills was given as 192, with 485 grinders, producing annually 2,008,680 tons; sulphite plants 90, producing annually 1,204-894 tons; soda pulp plants 31, producing annually 417,387 tons. In the sulphite and soda plants there were 555 digesters.

The More Immediate Present

Coming now to the more immediate present it appears by the census of 1914 that 118 paper and pulp establishments were producing annually to the value of $332,147,000, and a capital investment of $534,625,000, the wage earners and other employees being 95,156. Compared with 1909 the increase of capital in five years was 30 per cent; value of products 24 per cent; employees 17 per cent; salaries and wages 30 per cent. Comparative figures for 1904 and 1914 were: roll news, 841,000 tons, value $32,763,000 and 1,186,277 tons, value $47,332,392; sheet news, value $3,143,000 and $5,610,382; book paper, 435,000 tons, value $31,157,000 and 786,626 tons, value $58,496,221; writing paper, 132,000 tons, value $19,321,000 and 195,351 tons, value $28,637,257; other fine papers, 15,000 tons, value $2,928,000 and 52,377 tons, value $5,417,661; heavy wrapping, 97,000 tons, value $4,036,000 and 98,780 tons, value $3,588,357; straw wrapping 54,000 tons, value $1,389,000 and 15,606 tons, value $519,309; wood manillas, 228,000 tons, value $10,100,000 and 383,987 tons, value $17,975,630; boards of all kinds, 521,000 tons and 1,208,795 tons.

In 1919 the census figures were 713 establishments of which 48 manufactured paper only, 61 wood pulp only and 171 both paper and pulp. The total production was to the value of $789,548,000, paper alone amounting to 6,124,000 tons, valued at $682,043,000. Compared with 1914 when the production of paper was reported as 5,269,000 tons, valued at $291,588,000 the increase for that five-year period was 16.2 per cent in tonnage and 133.9 per cent in value. In addition, in 1919, five establishments, engaged primarily in the manufacture of other products, produced paper and pulp to the value of $1,064,777 and in 1914, nine such establishments produced paper and pulp to the value of $2,767,407. Wood pulp produced in 1919 was 3,519,000 tons and 2,893,000 tons in 1914 of this, groundwood in 1919 was 1,519,000 tons and 1,294,000 tons in 1914, while sulphite fiber in 1919 was 1,420,000 tons and 1,151,000 tons in 1914.

News print in rolls and sheets, in 1919 was 1,324,000 tons of a value of $98,560,000 and in 1914, 1,313,000 of a value of $52,943,000. Boards, of all varieties, surpassed even news print, in quantity and value of production in 1919. They were 1,885,000 tons, value $124,090,000; in 1914 the record was 1,291,000 tons, value $44,868,000. Book paper production in 1919 was 916,000 tons, valued at $143,826,000 and in 1914, 913,000 tons, valued at $70,690,000. The production of wrapping paper in 1919 was 932,000 tons as against 882,000 tons in 1914, the value in these years respectively being $114,936,000 and $49,373,000. Fine paper production in 1919 was 325,000 tons, valued at $87,741,000 and in 1914, 248,000 tons, valued at $34,055,000.

An Increase at Every Point in 1920

In 1920 there was at every point an increase in production over any preceding year. News print, book paper, fine papers, wrapping, boards: all made a big leap upward. Taking 1917 for comparison the figures in tons, were in the respective years:

All news print, 1,359,012 and 1,511,968; standard news, 1,238,787; book paper, 892,283 and 1,104,464; boards, 1,804,589 and 2,313,449; wrapping, 727,515 and 831,889; bag paper, 116,714 and 221,923; fine paper, 288,355; total of all grades, 5,919,647 and 7,334,614. Then in the next 12 months there was a drop all around to figures of production that were not only below those of 1917, but below each one of the succeeding three years. For 1921 the production of all news print was 1,226,189 tons; standard news, 1,130,943 tons; book paper, 725,992 tons; boards, 1,654,931 tons; wrapping, 651,605 tons; bag, 130,863 tons; fine paper, 242,485 tons; total of all grades, 5,356,317. Only the production of bag in 1921 was in excess of that of 1917, but as with the other kinds, it was still less than in the remaining three years of the period. The percentage decrease from 1920 to 1921 was: all news, 19; standard news, 18; book, 34; boards, 28; wrapping 22; bag 38; fine paper, 38; all grades, 27.

In the five years, 1917-1921 the production of wood pulp showed an increase in all grades to 1920 and then a falling off in 1921. The total of groundwood, sulphite, sulphate and soda was 3,371,-569 tons in 1917; 3,807,656 tons in 1920 and 2,801,438 tons in 1921. For groundwood the figures were 1,447,068 tons in 1917; 1,578,300 tons in 1920 and 1,268,012 in 1921. Production of sulphite in all grades was 1,405,387 tons in 1917; 1,555,676 tons in 1920 1,105,905 tons in 1921. The percentage of decrease in 1921 from 1920 was: groundwood, 20; sulphite in different grades, 26, 35, 14 and 27; sulphate, 30; soda, 37; total, 26.

Increased Use of Pulpwood

The steady growth of the industry into the opening years of the twentieth century was further emphasized by the increased consumption of pulpwood, year in and year out. In 1899 the paper mills used, domestic as well as imported, 1,986,310 cords and in 1906, 3,611,176 cords, a total increase of a little more than 60 per cent. In 1919 the total consumption was 5,470,332 cords valued at $87,166,083. This was an increase in quantity since 1899 of 3,484,022 cords or 175 per cent and in value during the same twenty years of $77,328,567, or 786 per cent. In 1919 the imports were 1,047,299 cords valued at $10,458,753; that is we were importing less than one-fifth of what we needed to use.

In 1921 the paper manufacturing of the country was done by 688 firms and corporations who operated 838 paper mills and 333 pulp mills; there were 175 groundwood mills, 94 sulphite mills, 36 soda pulp mills and 25 sulphate mills. The gradual recent introduction of a new pulp source was shown by the working of eight cotton fiber pulp mills and one grass fiber pulp mill. These nine mills were located in Florida, Georgia, Maine, Ohio, Tennessee, Texas and Virginia. The largest one, in Virginia, had a capacity of 400,-000 tons daily from cotton seed hull shavings; a Tennessee mill, using cotton linter had a capacity of 100,000 tons daily; the Georgia establishment also had a daily capacity of 100,000 tons of soda pulp from cotton fiber; the Texas Mill had a capacity daily of 20,000 tons and the Florida grass-fiber mill had a daily capacity of 50,000 tons. In the Maine and Ohio mills, whose daily capacity was 58,000 tons, cotton was not used exclusively. These figures are interesting as showing that this new raw substance had found a substantial place for itself in pulp making, though not as yet to be reckoned a serious competitor with the older materials.

Of the paper mills listed in this year eight were reported idle and there were six idle pulp mills. During the year 36 mills all told were either temporarily idle, burned, in the hands of receivers, closed permanently, transferred to other mills or transferred to use for other purposes. At the same time there were in operation in Canada 93 firms owning 67 paper mills and 101 pulp mills of which only three paper mills were idle.

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A Wider Distribution

Whereas in 1872 the principal establishments were in New England, New Jersey and Ohio with a few in the South, the Middle West and Northwest, fifty years later, in 1922, they were distributed country-wide, from Maine to Oregon and Alaska and from Michigan to Louisiana. New York still had the largest number, 166 paper mills and 98 pulp mills. Massachusetts was second with 106 paper mills but only five pulp mills. All of New England had 232 paper mills and 76 pulp mills, 149 of the latter in the state of Maine. Other states in order were Pennsylvania with paper mills, 73; Ohio and Wisconsin, each 38; Michigan, 56; Connecticut, 46; New Jersey, 45; Indiana, 32; New Hampshire, 32; Illinois, 26, and so on down the line to Rhode Island and Mississippi with one each, and Florida with a solitary pulp mill. As in all the past the South and South West had very few mills, only 29 paper and 26 pulp, including Virginia, 12 paper and 10 pulp. Pulp manufacturing was largely concentrated in seven states, New York with 98 mills; Wisconsin, with 57; Maine, with 49; Pennsylvania, with 16; Michigan, with 15; New Hampshire, with 13; Virginia, with 10; in all 257 out of the total in the entire country of 333 mills.

The Development of Electric Drive

Electric power for paper mills has been an improvement of the last 25 years. It was tried by the Cliff Paper Company, at Niagara Falls in 1896. A small plant of 300 horsepower was put in and at once demonstrated its practicability and its economy in running the Fourdriniers and other machines in the mill. In 1906 electric power was at work in the mills of the Munising Paper Company, Munising, Mich., and in 1917 the advantage of the electric drive was so fully appreciated among pulp and paper men that close to 300,000 horsepower was in use in the mills. In 1921, electric power was established in 376 paper or pulp mills, either alone or in connection with steam and water. Seventy of these mills were in New York, 27 in Massachusetts, 15 in Maine, 17 in Michigan, 25 in Wisconsin and 14 each in Pennsylvania and New Jersey.

The European War

From 1914 on the history of this business is the record of an industrial nightmare. Enmeshed as was everything and everybody in the tangle of the European War paper manufacturing was subjected to all the vicissitudes of that catastrophe. Difficulties were something enormous; scarcity with high and constantly changing prices of raw material; shortage of labor; wages high and steadily mounting higher; transportation reduced and dislocated; government restraint and fuel restrictions; excessive demands for paper and consumers' contentions over prices. All these and other things strained the resources of the industry and taxed, to the utmost, the energy, the business sagacity and the enterprise of the man behind it. On the whole, it was, everything considered, a period of prosperity despite the many drawbacks and uncomfortable conditions. In 1921 deflation, after the unexampled war inflation, set in. As compared with 1920 production fell off and prices dropped; news print for example, coming down to $80 in the last quarter of the year in striking contrast with the price of $130 in the January preceding. This was a healthy reaction and presages a getting back onto solid ground.

Imports and Exports

In any survey of the industry covering an extended period considerable consideration must, in all fairness, be given to the record of imports and exports. While these fall far from measuring either the scope or the progress of the business as a whole they are a barometer of value in indicating special phases of its activities and of the fluctuations in the domestic trade arising from foreign conditions. Undue emphasis may not be safely placed upon them but nevertheless we must recognize that America cannot live alone by itself and that our relations to foreign market in buying and selling are very real factors in our prosperity.

Since 1900 both our imports and our exports in raw materials for paper and in paper products have been gaining though not always steadily year by year. In 1900 our imports of paper and its manufactures, not including books, maps and other printed matter, were to the value of $3,795,645. By 1909 the amount had increased to $11,632,571, with slight fallings off in subsequent years, until in 1915, in the middle of the war period, the figures were $10,317,211. In 15 years, it appears, the increase was $6,521,566 or nearly 180 per cent. Imports of printing paper in 1909 were to the value of $903,705 with very slight increases in the years immediately following until in 1913 when they jumped to $6,034,023, while the mid-year of 1915 showed them up to $13,119,912.

Imports of paper stock, including rags, but not wood pulp, amounted in value in 1900, to $3,261,778 and in 1914 the values of $8,571,207 were reached. Then in 1915 the full effect of the European War was shown by a fall of nearly 45 per cent to $4,817,583. Imports of wood pulp in 1900 were to the value of $2,405,630 and increased to $13,980,357 in 1911, to $16,165,316 in 1913 and to $19,881,111 in 1915. Leaving out of consideration the effect of the Canadian Reciprocity after 1911 and the effect of the war in 1915 the increase under normal conditions 1900-1910 was $11,574,727, an increase of over five hundred per cent.

For the five years 1917-1921 our total imports of paper stocks in net tons were: 698,818; 607,606; 746,211; 1,161,052; 814,505. Of this total groundwood pulp in each of those years in succession was: 279,073; 185,478; 202,253; 233,148; 190,744; sulphite unbleached: 248,173; 253,454; 239,952; 34,969; 233,064; sulphate unbleached: 107,933; 118,761; 145,911; 182,697; 174,004. The value of these imports in 1919 were $4,033,788; in 1920, $8,792,578; in 1921, $118,014,676.

We imported in paper of all kinds, including books and other printed matter, news print and pulp board in rolls: in 1919 to the value of $53,602,174; in 1920, $84,686,852; in 1921, $92,462,472.

During the ten years from 1900 to 1909 both inclusive, we exported paper and its manufactures, exclusive of books, maps, and other printed matter, to annual values as follows: $5,417,884: $6,215,183; $7,438,901; $7,312,030; $7,180,014; $7,543,728; $8,238,088; $9,536,065; $9,856,733; $8,064,706; $7,663,139. Printing paper was exported in 1900 to the value of $2,521,320. In the subsequent ten years these figures did not materially change being the highest, $3,489,589 in 1901; the lowest, $2,140,582 in 1908 and $2,766,659 in 1910. The figures rose to $3,689,553 in 1911; to $4,057,219 in 1913 and to $4,669,009 in 1915. Writing paper and envelopes rose in value of exports from $463,248 in 1900 to $1,351,226 in 1913, dropping to $1,098,197 in 1915.

In the three successive years, 1919, 1920 and 1921, our exports of domestic paper stock, exclusive of wood pulp: 54,541,361 pounds, value $1,533,913; 84,666,468, value $2,718,929; 40,411,442, value $739,525. In the same years news print was exported as follows: 230,505,014 pounds, value $10,091,651; 91,777,916 pounds, value $5,970,127; 33,641,462 pounds value $2,162,975. In 1919 our largest news print export to any one country was to Argentina, 52,469,936 pounds, value $2,185,846; next in order came Brazil, 30,991,533, value $1,393,940; and third was Cuba, 19,923,883 pounds, value $925,479. In 1920 we sent to Argentina 41,358,842 pounds of news print, value $2,141,185 and to Cuba, 16,370,866 pounds, value $1,075,100. In 1921 Cuba was the only country to which we exported any considerable quantity of news print in comparison with the preceding years, the amount being 17,544,036 pounds, value $1,027,044. News print exports to other countries than those mentioned were relatively small and decreased tremendously from 1919 to 1920. Also Argentina dropped from 52,469,936 pounds in 1919 to 4,468,693 pounds in 1921 and Brazil from 30,991,533 pounds in 1919 to 233,236 pounds in 1921, and other South American countries that bought from us in 1919, 10,613,644 pounds,

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bought only 1,553,128 pounds in 1921. The total exports of all kinds of paper, manufactures of paper, including books, maps and other printed matter, in those three years was to values of $86,983,063; $89,072,289; $49,497,822.

Financial Expansion

On the purely financial side of the industry the closing years of the nineteenth and the opening years of the twentieth century were distinguished by a movement that was not altogether unexpected, nor unprecedented in character and that exercised a profoundly changeful and powerful influence in developing the business along newer lines into what it has since become, one of the biggest, most useful and most important enterprises in the economy of the nation. Under the influence of steam, electricity and machinery and in response to the calls of a necessitous, progressive and exacting civilization this had come to be an era of combinations of capital bringing about a revolution commercial and industrial in all branches of human endeavors. Centralization has gradually grown into an accomplished fact in civil and national life until the centuries-old segregations of population had largely disappeared. Business, perforce, followed this evolution and capital was compelled into concentration, not alone to save itself but even more to meet the needs and the demands of the common weal for employment and maintenance. In place of small business concerns and corporations, constricted in their activities of production and distribution and finally uneconomically competitive in the struggle for existence there was the insistance upon aggregations of capital that could advantageously employ armies of helpers, that could profit by the mutuality of energy of many men and that could minister to the needs, not of small and unduly separated localities but to States and the Nation in the broadest and most intensified way.

As in other industries the manufacturers of paper felt the stress of conditions. Loose gentlemen's agreements had, from time to time been called into existence in attempts to meet and overcome the recognized ills. Generally these aimed to restrict production when restriction was considered advisable by reason of the ruinous flooding of the market, to control amount and distribution of output and to maintain prices in endeavor to steady business. Such efforts never succeeded in accomplishing the desired results. As an outcome of these futile endeavors and the further considerations of the problems of the hour co-operation and consolidation, as those measures had been applied in other branches of industry, were finally recognized as the only ultimate hope for regeneration and stabilization on the part of paper manufacturing. A few such schemes were put through successfully, in a small way and they were the precursors of the bigger accomplishments that became impressive and lasting. Within the limitations of the present review, it is not possible nor is it necessary to make here a complete record of all the large consolidations and capitalizations that were carried out in this period. Enough may be cited from all that was done from 1900 on to show the trend of the movement, the millions of capitalization involved and some of the results financial and industrial that have been the outcome.

The International Paper Co.

The International Paper Company was the first of these large corporations to come into existence and it has been the biggest, most influential and most successful of its kind in this modern consolidation movement. It was incorporated in January, 1898, with a capital stock of $45,000,000,—preferred $25,000,000 and common $20,000,000—and a bonded mortgage of $10,000,000. At the outset the company acquired in the eastern states, many of the most important mills that were manufacturing news print and gradually it added to its possessions other paper and pulp mills, woodland and water powers. In 1901 it owned thirty-four mill plants, water powers and woodlands in Maine, New Hampshire, Vermont, Massachusetts, New York, and Ontario, and had controlling interests in the Continental Paper Bag Company, the St. Maurice Lumber Company, the American Realty Company, the American Sulphite Company, the Winnipiseogee Lake Cotton and Woollen Company, and the Michigan Pulp Wood Company. Its assets then were $41,586,694 in Mill plants and $4,101,723 in Woodlands and other properties.

Alonzo N. Burbank was the organizing president of the company but he served only temporarily, William A. Russell being the first active president. Upon the death of Mr. Russell in 1899 Hugh J. Chisholm was elected to the presidency and was the controlling power in the corporation during the years of its developing period. Mr. Burbank was again president in 1907 and after and active in the direction of the affairs of the company were such men as Warren Curtis, Frederick H. Parks and Albrecht Pagenstecker.

In 1916 the company owned and operated twenty-three mills. In New York were the Glens Falls, Fort Edward, Hudson River, Niagara Falls, Curtis, Lake George, Piercefield, Cadyville, Watertown and Woods Falls; in Maine, the Otis, Rumford Falls, Webster, Livermore, Solon, Riley and West Enfield; in New Hampshire, the Glen and Winnipiseogee; in Massachusetts, the Montague; in Vermont, the Fall Mountain, Wilder and Milton. All these plants had mills for producing ground wood-pulp, their total daily capacity being 1,507 tons. With the exception of the Curtis, Livermore, Solon, Cadyville, Riley, West Enfield, and Milton all had paper mills with a total daily capacity of 1,723 tons. Nine of them had sulphite in addition to their paper and ground wood mills, the daily capacity in that kind of pulp being 517 tons of which the Rumford Falls mill with 120 tons daily was the largest producer. In 1921 the company was owning and operating the same mills with practically the same capacities, except the sulphite mills with a daily capacity of 592 tons. It also had the Van Buren pulp mill in Maine and a pulp mill in Three Rivers, Quebec. The largest ground wood mills were the Hudson River, daily 230 tons and the Cadyville, daily 105 tons; the Rumford Falls, Livermore, Wilder and Woods Falls ground-wood mills were each of 90 tons daily capacity. Philip T. Dodge was the president of the company in 1916 and was still holding that office in 1921. With him were associated Ogden Mills, William E. Haskell, Chester W. Lyman, Owen Shepherd and others. The capitalization remained as before with the addition of $6,206,000 first and refunding mortgage 5 per cent bonds.

The American Writing Paper Co.

Close after the International Paper Company came the American Writing Paper Company which was incorporated with a capital of $25,000,000, Elisha Morgan of Springfield, Mass., being the moving spirit in the consolidation and the first president of the company. Some of the men connected with this corporation at the outset were Bradley D. Rising, George C. Gill, Henry S. Dickinson, W. N. Caldwell, G. B. Holbrook, William H. Heywood, R. F. McElwain, Henry L. Higginson, C. A. Crocker, James H. Newton, O. L. Greenleaf, A. W. Eaton and Aaron Bagg.

Mills taken over were those of the Beebe & Holbrook Paper Company, Chester Paper Company, Massasoit Paper Company, Esleeck Paper Co., Hurlbut Manufacturing Company, Crocker Manufacturing Company, Oakland Paper Company, Springdale Paper Company, Parsons Paper Company, Norman Paper

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Continental Paper and Bag Mills

The Continental Paper Bag Company, now the Continental Paper & Bag Mills, was organized in 1899 to take over the business of the Elsas Paper Company, of New York. It was capitalized with preferred stock of $2,500,000 and common stock of $2,500,000, on the basis of valuable patents for making self-opening square bags. Operations were begun in Rumford, Maine, in 1900, in a new and well-equipped plant, and other mills and factories were acquired in subsequent years until, in 1921, the company owned and operated two tissue mills and a toilet paper and paper towel factory in Ashland, N. H.; a similar mill in Watertown, N. Y.; a tissue mill in Greenwich, N. Y.; mills at Oconto Falls, Wis., Marinette, Wis., and Menominee, Mich., for the production of sulphate, sulphite and ground wood pulp, manila, fibers and kraft papers and the plant of the York Haven Company, at York Haven, Penn. Under the name of the Continental Wood Products Company, Limited, the company secured extensive freehold woodlands at Elsas, Ontario, and Lachevrotiere, Quebec, vast acreage of spruce with rossing plants and saw mills. It also owns timber lands in Wisconsin and Michigan. Such extensive operations require large capital investments and the history of this company thus becomes typical of the new methods of business of this epoch. It is now capitalized at $12,500,000 and Herman Elsas remains at the head of the corporation as he was in 1899. The mills in Watertown, Ashland and Greenwich had in 1921 a daily capacity of 60,000 pounds of tissue and 16,000 pounds of ground wood. Those in Marinette, and Oconto Falls in Wis., in Menominee, Mich., and York Haven, Pa., had a combined capacity daily of 350,000 pounds of wrapping paper; 240,000 pounds of sulphite, 100,000 pounds of sulphate and 130,000 pounds of ground wood.

United Box Board and Paper Co.

With a capital of $29,000,000 the United Box Board and Paper Company came into existence in 1902 taking over mills operated by 28 companies and firms making straw, news and other boards. That was merely the beginning of a career of internal dissensions and outward difficulties, a disorganization of the ambitious consolidation, receivership proceedings and finally a reorganization in 1912 into the United Paperboard Company, Sidney Mitchell president, with a capital stock of $14,100,000. In 1916 the company owned and operated eleven paperboard mills with a total daily capacity of 372 tons, increased to 527 tons in 1921, in Maine, New Jersey, New York, Illinois, Ohio and Indiana; six ground wood mills daily capacity 93 tons in Maine, New York and Indiana; one soda mill, daily capacity 30 tons in Maine and one sulphite mill, daily capacity 30 tons in New York.

Union Bag and Paper Corporation

The Union Bag & Paper Company, now the Union Bag and Paper Corporation, was organized in 1910 to take over the already-existing company of the same name, together with the Consolidated S. O. S. Bag Company, the Van Nostwick paper and bag interests and several paper and pulp mills in New York, altogether 13 plants in New York and Wisconsin. The authorized capital stock was $27,000,000 and the authorized bond issue $5,000,000. In 1916 the company was operating in Hudson Falls, N. Y., and Kaukauna, Wis., ten mills with daily capacity of 215 tons of paper, 59 tons of ground wood and 140 tons of sulphite fibre and bag factories in Hudson Falls, Kaukauna and Chicago; and it controlled a subsidiary company in Canada, the St. Maurice Paper Company. In 1921 it owned and operated five paper mills, in New York, Michigan and Wisconsin with a daily capacity of 250 tons; three groundwood mills in New York and Wisconsin with a daily capacity of 27 tons and a sulphite mill in Hudson Falls and another in Sheboygan, Wis., the daily capacity of the two plants being 160 tons. Another subsidiary company was the Badger Paper and Bag Company of Wausau, Wis.

Great Northern Paper Co.

The Great Northern Paper Company began in 1899 and 1900 with a capital of $4,000,000. Among its founders were Oliver H. Payne, Augustus G. Paine and Garrett Schenck, and it has been one of the conspicuous successes in its generation. A big modern mill was built at Millinocket, Maine: 260,000 acres of timber land were acquired and subsequently other properties were secured in Millinocket and in Madison, Me. In 1921 Garret Schenck was president of the company which had three paper mills in Millinocket, East Millinocket and Madison, and three pulp mills, in Millinocket, East Millinocket and Madison. In its three paper mills it had 17 Fourdrinier machines, six of them being 158 inches. The daily capacity of the three mills was 1,540 tons of news, wrapper and bag paper, nearly all of it news. The three pulp mills had a daily capacity of 1,634 tons of ground wood and sulphite, the greater proportion being ground wood.

West Virginia Pulp and Paper Co.

Another notable consolidation of this early period was that of the West Virginia Pulp and Paper Company which, already a large and successful concern under the presidency of John G. Luke, was reincorporated in 1899 and took in the property of the Morrison & Case Paper Company in Tyrone, Penn. In 1921, with members of the Luke family still in full control, the company was operating five paper mills in Maryland, Virginia, Pennsylvania and New York, and six pulp mills in the same localities. The product of all the paper mills was book, lithograph, magazine, writing, label and similar kinds of paper. The daily capacity of the five mills was 1,100 tons. In these mills were 22 Fourdrinier machines. The daily

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capacity of the six pulp mills was 460 tons of soda fiber and 440 tons of sulphite fiber.

Interest of Financiers in Strawboard

For upward of 25 years the strawboard interests were the subject of more attention from financiers, promoters, pooling agents and speculators than any other branch of the paper industry. From before 1890 and there onward there was never a time when strawboard was not conspicuous some way or other. Early in the game many of the mills had pooling arrangements and a merry war of price-cutting between them and their competitors went on with little interruption. Finally, about 1889, the Union Straw Board secured control of ninety per cent of the mills but it was captured by the American Straw Board Company which, with a capital of $6,000,000, was able to control. But competition developed and the independents exerted a considerable influence upon the market. The Standard Straw Board Company, a selling organization, was affiliated with the American Straw Board Company for a time in a futile effort to control prices and this was followed by the Straw Board Manufacturers' Association which had no more success. On the part of the independent mills the Manufacturers' Straw Board Company was created to sell and to determine prices and as the years went on other efforts of like character figured in the field. Through it all the American Straw Board Company maintained its existence amid varying fortune and has considerably dominated even if it has not always been able wholly to be undisputed master in the field. O. C. Barber was one of the founders of the company in 1889 and its president for many years. In 1916 the company had thirteen mills in Ohio, Illinois, Maryland, Virginia, Connecticut and Indiana, and nine of these with a daily capacity of 474 tons were in operation. In 1921 it was operating five mills in Illinois, Indiana, Ohio and Virginia with a daily capacity of 594,000 pounds.

Scores of New Concerns Incorporate

This movement to expanded capitalization continued almost uninterruptedly from the time of its beginning until the time when this recapitulation is ending, a period of a full quarter of a century. Scores of new concerns were incorporated with capitalizations ranging from half a million to many million dollars while others, already well established, increased capitalizations in similar figures. Million dollar corporations became almost commonplace. Some of these were of mushroom growth but most of them became stable going concerns. In the earlier stage of this brilliant development some of the other large corporations that were notable, besides those already reviewed were: the union of the Bryant Paper Corporation, the Imperial Coating Mills and the Superior Paper Company into the Bryant Paper Company of Kalamazoo, Mich., with a capital of $3,000,000 which was increased to $6,500,000 in 1916 when the company had become the largest book paper producing concern in the world; the Nekoosa-Edwards Company with a capital of $3,000,000 absorbing the Nekoosa Paper Company, the John Edwards Manufacturing Company and the Port Edwards Fibre Company, the St. Croix Paper Company, $2,500,000; the Finch, Pruyn & Co., $3,000,000; the Crown-Columbia Pulp and Paper Company, $1,000,000, made up of the Columbia River Paper Company and the Crown Paper Company; the Champion Paper Company to build a pulp mill in North Carolina, $1,000,000; Gardner Tarvey Paper Company and the Middletown Paper Bag Company; the Kimberly-Clark Company with $2,000,000, to take over the properties of the Kimberly & Clark Company; the Crown-Willamette Paper Company, of San Francisco, $13,000,000; the Cornell Woods Product Company, of Wisconsin, $3,500,000, and Pulp, Paper and Lumber Company, of Spokane, $4,000,000; the Eastern Manufacturing Company of South Brewer, Me., $2,000,000; the Western Mills Company of Seattle, $10,000,000; the By-Products Paper Company of Niagara Falls, $2,000,000; the American Sault Ste. Marie Company, $4,000,000; the Consolidated Lake Superior Company, $100,000,000; the Remington Paper and Power Company, $1,575,000; the Hammermill Paper Company, $1,500,000; the Rocky Mountains Paper Company, $1,350,000, to acquire the Denver Paper Mills; the General Manifold Company, of Franklin, Pa., $4,000,000.

Other Notable Capital Increases

In 1919 there were served other notable increases of this kind in Michigan. Ten new corporations organized or in the Kalamazoo Valley district organized or filed articles with an aggregate capital of $6,350,000 and twelve companies increased or prepared to increase capital stock to the amount of nearly $20,000,000. The Eddy Paper Company increased its common stock to $7,000,000. The Kalamazoo Vegetable Parchment Company advanced from $1,000,000 to $3,000,000; the Monarch Paper Company from $750,000 to $1,500,000; the Sutherland Paper Company from $500,000 to $1,000,000; the King Paper Company from $1,000,000 to $2,000,000; the River Raisin Company from $2,550,000 to $5,080,000; the Escanaba Pulp and Paper Company from $2,800,000 to $3,000,000. And the Kimberly-Clark Company, of Wisconsin, in the same year increased its capital stock from $3,000,000 to $5,000,000 in order to expand operations by developing, through the Spruce Falls Company, Limited, extensive paper, pulp, power and lumber plants at Kapuskasing, Ontario; and at Niagara Falls a paper mill and a pulp mill in connection with a timber tract of 1,200,000 acres near by and two power sites capable of 20,000 horsepower.

A long, long chapter could be written about the efforts that have been made, only to result in failure, to corral various branches of this industry into the protecting and promising embrace of swollen capital. The shifting activities attending these attempts have always been picturesque and sometimes exciting features of the current news of their day. For the moment of their brief existences they were quite as much in the limelight, as their more rational and stable competitors. In its way the story of these misadventures is impressive and valuable in the lessons to be drawn therefrom, even if they prematurely perished. Their wrecks have been a wholesome warning.

A Spectacular Fiasco

A spectacular fiasco of the early nineties that has not been entirely forgotten, especially by the unwary who allowed themselves to be drawn into it was the short-lived White Mountain Paper Company. This was set up with a capital of $15,000,000 in 1901 with D. B. Plunkett, John C. Morgan, George H. Hensel and John M. Ferry, who had not before been prominent in paper manufacturing are the promoters and first officers of it. Construction of a pulp and paper plant was begun in Portsmouth, N. H., but the production and financial results that were promised did not materialize. Placed in the hands of a receiver in 1903 the company was declared bankrupt in 1903. The Publishers Paper Company organized with a capital of $6,000,000 purchased the property in 1905, but that too after operating the mill for a year or more also failed.

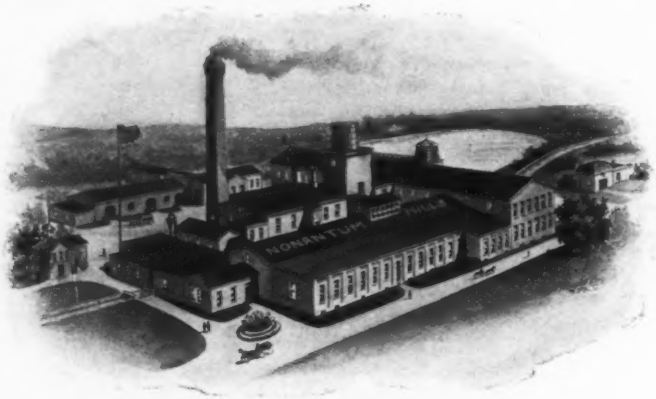
The Consolidated Lake Superior Company was organized to control various industries including that of making pulp at the Canadian Soo. It was water-logged with a capital on paper of $100,000,000. About $30,000,000 were expended when the concern was driven on to financial rocks. A loan of $3,000,000 was negotiated by pledging stock holdings in some of the subsidiary companies of the corporation.

That was the end for the concern was bankrupt and sold out before the end of the year 1903.

ALFRED A. CURTIS, President

CHAS. MAGARGE LEVIS, Vice-Pres. and Sales Mgr.

F. LINDSEY CURTIS, Sec. and Treas.



MILLS OF CURTIS & BROTHER, INC., NEWARK, DEL.

CURTIS & BROTHER, INC.

PAPER MAKERS

Sales Office and Warehouse

14-16 South Fifth Street ∴ Philadelphia, Pa.

OFFSET—CURBRO OFFSET.

SUPER CALENDERED BOOK—Nonantum Plate and No. 1 S. S. & C.

MACHINE FINISH—Curtis No. 1 M. F.

HIGH GRADE ANTIQUE—Nonantum Double Antique Wove, Nonantum Velvet Finish, Newark Wove India, Dover Laid, Nonantum Antique Wove.

COATED BOOK—Delaware Coated and Curbro Coated.

COVER PAPERS—Paradox, Duane and Universal.

WRITING PAPERS—Nonantum Kid Finish Wedding, and Curtis Bond.

Conspicuous Disasters

Among some of the pulp board men high expectations were held in the National Board and Paper Company, organized in 1899 to acquire the McEvans patents. Presently there came out the National Wood Board Company; and then the National Pulp Board Company; and then the National News Board Company; and then nothing more. The straw-wrapping mills were many of them wrapped up into the Columbian Straw Paper Company, with a capital stock of $4,000,000. Begun in 1892 the company lived three years, being sold out under foreclosure in 1895.

The Paper Products Company was organized to take charge of the sales and output of the United Board Company and independent mills. The Interstate Paper Company was organized in 1903 to control the sale of nearly all the book paper of the mills of the West and Northwest. The National Wall Paper Company and its successors the Continental Wall Paper Company lasted a few years. The Manufacturers' Investment Company started ambitiously in 1891 with mills in Madison, Me., and Appleton, Wis., but in 1899 its properties passed through the hands of the receiver to other owners. The Union Waxed and Parchment Paper Company was incorporated with a capital of $1,800,000, but later its business was contracted into the Climax mills in Hamburg, N. J., where in 1921 it was a division of the Hercules Paper Corporation. The United Paper Company, popularly known as "The Tissue Paper Trust," was incorporated in 1892, absorbed twelve miles in New York, New Jersey and Ohio, but after less than a year of strenuous competition with rival tissue manufacturers it went into the hands of a receiver and resolved into its original constituent elements. The Singerly Pulp and Paper Company was created in 1890 by William M. Singerly, proprietor of *The Philadelphia Record*, with a capital of half a million dollars, built a mill in Elkton, Md., and lasted eight years, only being finally wiped out of existence as a going concern in the Singerly failure in 1898. These were the most conspicuous disasters of their kind in this inflation period. Their downfall seemed, in a way, to clear the atmosphere of the financial extravagance that had colored it for a few years. It is worthy of emphasis and significant of the underlying soundness of the paper manufacturing business that this phase of hollow bombast did not endure and that it left no lasting effect after it had disappeared.

Underlying Soundness of the Industry

On the other hand the impressive fact has remained that the large concerns that were solidly and honestly built upon real foundations of financial and business worth have amply justified themselves. These combination of common interests that had been always divided and more or less antagonistic, and the resultant unity in aims and efforts of the master minds in the industry, with the advantage of abundant working capital, were in the highest degree beneficial; and experience since then has fully confirmed the wisdom of those financial methods. Stabilized and stimulated, as was imperatively needed, the business demonstrated a new efficiency beyond what had been thought of before and moved on rapidly in an extension and development such as had been known in no other industry of the country save that of steel. And the large corporations have been the mainstay of the industry in its contemporaneous upbuilding.

Increasing Size of Machines

One of the most remarkable developments of this half century in the industry has been the steady and wonderful increase in the size and the production power of paper-making machinery. This, of course, relates—though not alone—with special emphasis to the Fourdrinier. That machine from the time of its introduction into this country in 1827 surely, even though at first slowly, made its way to recognition until it became the dominant factor that it is today. It is the commonplace to say that it revolutionized the industry, but its first promise has been more than met by its astounding accomplishment during the last 25 and 50 years. It is well worth to recall, step by step, the history of this machine in its improvement and to expanding usefulness. In no better wise can we be impressed with its power today and its possibilities tomorrow.

One need not go far back to know the time when an eighty-four inch machine was regarded as a wonder. In 1872 when the PAPER TRADE JOURNAL came into being the ordinary speed of the Fourdrinier was from sixty to eighty feed per minute on printing paper but a single wonder was then in existence that was running at the rate of one hundred and seventy-five feet per minute and producing twenty-five tons of paper every week. An author of a treatise on paper manufacturing in 1873 was, in common with most other of his time, very sceptical of any great advance in these machines. He wrote:

"If every part is constructed with the utmost care, substantially and true a machine with a wire thirty-three feet in length and seven drying cylinders of three feet diameter can make news print paper at a speed of from one hundred to one hundred and thirty feet per minute. The width of the machines has also been increased until wires eighty-six inches wide are now quite numerous and some of ninety inches and even one hundred inches are in use."

The ink of this writing was scarcely dry on the paper when at least one mill in the United States threw all that went before quite into the shade. This was in 1880 when a Fourdrinier in the P. H. Glatfelter mill in Spring Forge, Penn., attained a speed of two hundred and fifty feet a minute. But when Warren Curtis put into the mill at Palmer's Falls, N. Y., a machine one hundred and twelve inches wide, running off paper at a speed of two hundred and fifty feet a minute, presently increased to three hundred and twenty-five feet, the wonder at that size and that speed had not entirely subsided. Before the end of the century machines one hundred and sixty inches wide had come into considerabl use. Thomas H. Savery, writing for the PAPER TRADE JOURNAL in the summer of 1897 reported that the widest machine then in operation was one hundred and sixty inches wide and that a few had a speed of 500 feet a minute. At the same time George W. Knowlton, in the twenty-fifth anniversary number of the PAPER TRADE JOURNAL said: "I well remember that on two machines on which I had some practical experience the extreme speed with the water-wheel gate wide open was 36 feet a minute. Compare that with a machine 160 inches wide running 500 feet a minute." The exclamation point concluding that sentence expressed his astonishment at the stupendous accomplishment. Soon after this the largest machine then in the world was heralded, a Fourdrinier, built by the Rice, Barton & Fales Machine and Iron Company for the Rumford Falls Paper Company of Rumford, Me. The felts for this machine were one hundred and seventy-two inches wide, the width of the paper run was one hundred and fifty-two inches. There were then four other mills equipped with machines capable of making merchantable news print continuously at 500 feet per minute. Those mills were in the plants of the Glens Falls Paper Mill Company of Glens Falls, N. Y., the Hudson River Pulp and Paper Company of Palmer's Falls, N. Y., the Glen Manufacturing Company of Berlin, N. H., and the Willamette Pulp and Paper Company of Oregon City, Ore. Even then, in the face of this accomplished success many doubters refused to be convinced. An English writer in 1897 conceded that: "A modern machine will produce a piece of paper 300 to 400 feet long and 120 inches wide in one minute and will turn out about 55 tons of paper per week." And in that declaration he thought that he had gone quite as far as could be reasonably expected. But another English author at that time was even less reserved in his skepticism. He had heard about the American machines that were said to be running at 500 feet per minute but could not bring himself to believe it, writing:

"It may some day happen that the construction of paper machines

CAREW QUALITY

1848-1922

In South Hadley Falls, across the Connecticut river from Holyoke, the Carew Manufacturing Company built its first mill 74 years ago, the structure being burned and rebuilt in 1873.

Joseph Carew, the treasurer and agent of the company, had his first experience in the South Hadley Falls mill of Howard & Lathrop, the competitors of the celebrated Ameses early in the nineteenth century. In 1830 he took charge of this mill, remaining until it was burned in 1847, and in the following year he organized the Carew Manufacturing Company.

In its early days the Carew mill had a capacity of two thousand pounds of fine writing every twenty-four hours. The business is today continuing with production increased to twenty-four thousand pounds a day on ledger, linen, bond and writing.

The Carew Manufacturing Company was very successful from the start, and has since been one of the most prosperous mills in the paper industry.

HAMPSHIRE PAPER CO.

1866—1922

The 56 years from 1866 to 1922, which measures the life of the HAMPSHIRE PAPER COMPANY, covers the most interesting period in the writing paper industry—that of specialization and refinement of product.

Character and intelligence in direction and operation have given to this company its enviable reputation. Its acknowledged leadership was inspired by the late John H. Southworth and the late Charles H. Southworth, father and son, in successive control of the affairs of the corporation.

Upon the foundation which these men laid, the management of today have built more broadly, until with facilities enlarged and methods perfected, the HAMPSHIRE PAPER COMPANY is master of a specialized product that is known throughout the United States and beyond its borders.

The [illegible] product is, of course,

Old Hampshire Bond

made a little better than seems necessary. It is the first paper that was nationally advertised and distributed with ample selling protection to both dealer, agent and printer.

SOUTH HADLEY FALLS, MASS.

will be so improved and the "stuff" worked in such a way as to enable paper makers to work with advantage at this high speed; but I think I am right in saying that the general concensus of opinion is strongly against such high pressure for profitable work."

And the race did not end there. Within 20 years American mills had Fourdriniers a-plenty working from 150 to 186 inches wide and running at a speed of 636 to 650 feet per minutes, while cylinders had reached the size of 142 and 145 inches. In 1916 the largest Fourdrinier in the country,—186 inches—was in the Columbia mill of the Crown Williamette Paper Company at Comas, Wash. In the mill of the Minneapolis and Ontario Power Company at International Falls, Minn., were two Fourdriniers 184 inches each; and the same company had also two machines of 154 inches. Other plants of this date equipped with big Fourdriniers were: the Rumford Falls mill, nine, from 78 to 150 inches; the Ohio mill nine, from 77 to 145 inches; the Oxford mill, ten, from 78 to 142 inches; the West Virginia Pulp & Paper mill in Maryland, seven, from 72 to 152 inches; the eight mills of Crocker, Burbank & Co., in Fitchburg, Mass., fourteen, from 72 to 156 inches; the mill of the New York and Pennsylvania Company in Johnsonburg, Penn., eight, from 96 to 158 inches; the Great Northern Millinocket mill in Maine, eight, of 152 inches and one of 158 inches; the Columbia Mill of the Crown Williamette Paper Company in Comas, Wash., six, from 84 to 136 inches, one of 152 inches and one of 186 inches; the Cumberland, Me., mills of the S. D. Warren Company, twelve, from 56 to 145 inches.

In 1899 American mills had 663 Fourdriniers and 569 Cylinders; in 1904, 752 Fourdriniers and 617 Cylinders; in 1909, 1804 Fourdriniers and 676 Cylinders. The total annual tonnage capacity of these machines in the same years was 2,782,219 in 1899; 3,857,903 in 1904; 5,293,397 in 1909. According to statistical director for 1921 reports there were then 933 Fourdrinier machines in operation. Of these 146 were in Maine; 153 in Massachusetts; 140 in New York; 122 in Wisconsin; 78 in Pennsylvania. There were over 800 cylinder machines of various styles. The International Paper Company had 78 Fourdriniers in their 15 mills in Maine, Massachusetts, New Hampshire, New York and Vermont; the American Writing Company had 35 machines in eight mills in Holyoke, Mass.; in the Cumberland mills of the S. D. Warren Company, in Cumberland, Me., were 13; the Crown-Willamette Paper Company had 20 at its three mills in California, Oregon and Washington; the Great Northern Paper Company 10 in the Millinocket mill and two in the Madison mill; Crocker, Burbank & Co. Association 16 in the eight mills in Fitchburg, Mass; the Kimberly-Clark Company 13 in its mills in Kimberly, Neenah and Niagara, Wis., and Niagara Falls, N. Y.; the Oxford Paper Company 11 in the Oxford, Me., mill; the New York and Pennsylvania Company eleven in its mills in Johnsonburg and Lock Haven, Penn. These machines generaly ranged in size from 77 to 158 inches, though some of them went beyond that largest figure. The Oxford mill had one of 162 inches; the Hollingsworth & Whitney Taconnot mill at Winslow, Me., one of 158 inches; the St. Croix Paper Company mill at Woodland, Me., one of 158 inches and one of 166 inches; the Groveton, N. H., mill one of 158 inches; the Fessimore mill of the Union Bag and Paper Corporation at Hudson Falls, N. Y., two of 158 inches; the Escanaba Paper Company mill at Groos, Mich., two of 165 inches; the Kalamazoo Vegetable Parchment Company mill at Kalamazoo, Mich., one of 165 inches; the Manistique Pulp and Paper Company mill at Manistique, Mich., one of 166 inches; the Hoskin-Morainville Paper Company mill at Menominee, Mich., one of 164 inches.

Some Exceptional Records

In 1920 we had once more the fastest running paper machine in the world repeating the many such from time to time during the last half century. This one was built by the Eagley & Sewall Company to produce one thousand feet of twenty-pound kraft per minute at the plant of the Wausau Sulphate Fibre Company, Mosinee, Wis. Also in 1920 the installment of the largest machine in the world for turning out book paper was recorded. This machine was set up in the new plant of the Kimberly-Clark Company at Niagara Falls, N. Y., and was then heralded as "the last word in paper-making efficiency." It was built by the Pusey & Jones Company, had a width of 196 inches, was electrically driven and was capable of a maximum speed of 600 feet per minute. Two fast-running machines set up in the plant of the Laurentide Company at Grand Mere, Quebec, in 1921 established a new record for speed in running news print. These Fourdriniers built by the Dominion Engineering Works of Montreal were each 166 inches wide trimming to 146 inches and were started at speeds up to 800 feet per minute with the expectation that they would soon be reeling off paper at the rate of 1,000 feet per minute.

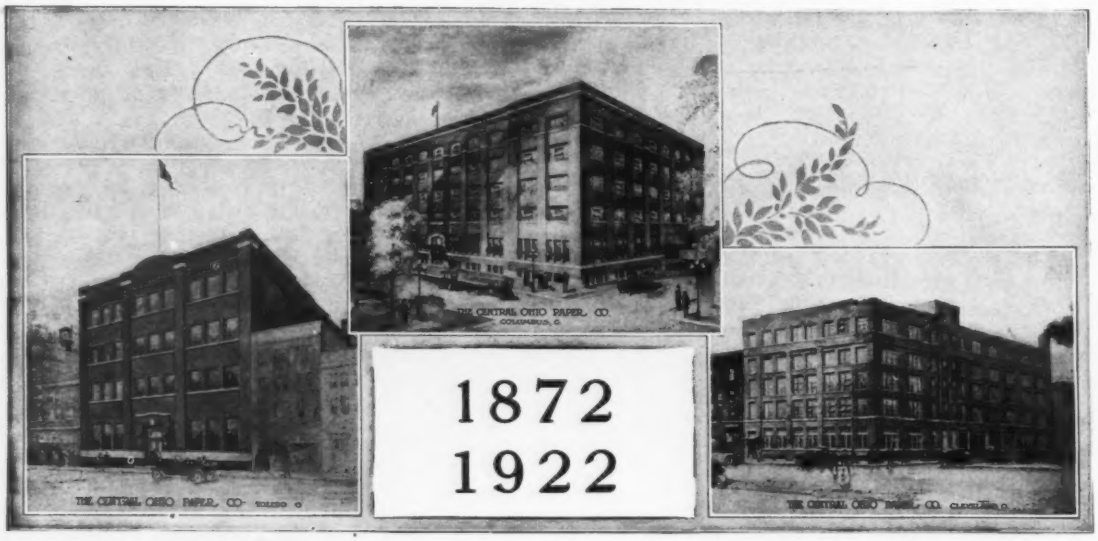
But something even faster than that was to come. In 1921 the Beloit Iron Works, working from designs prepared by L. A. Guerre and other paper-mill engineers, constructed an immense machine tor the Consolidated Water Power and Paper Company of Wisconsin Rapids. This machine was 300 feet long, was calculated to turn out a sheet of print paper 146 inches wide and had a rated speed of 1,200 feet a minute. And then in 1921 the Abitibi Power and Paper Company at Iroquois Falls, Ontario, which already had a 202-inch Walmsley Fourdrinier running off a trimmed sheet of 192 inches at the rate of 700 feet a minute surpassed itself with a 232-inch machine of the same make, running a trimmed sheet 220 inches.

Increasing Interest in Forestry

The steadily increasing depletion of our forest resources has insistently demanded more and more serious attention to paper men as well as to other manufacturers and the lumber men generally as the years have gone by. Real shortage of paper by reason of shortage of pulp has never been felt but an ultimate scarcity is certainly not far in the future if the wasteful method of cutting timber that have heretofore prevailed are allowed to continue. Conservation of native forests has become imperative. And none has realized that more than the manufacturer of paper. In 1908 the International Paper Company, owning 900,000 acres of timber land, decided to limit the cutting to the annual growth and other measures of similar purposes have been from time to time proposed.

The Forest Service of the United States Department of Agriculture in 1908 estimated that a wood land area equal to the entire acreage of the State of Rhode Island was being stripped every year for spruce. The United States was then using three or four times its annual growth of wood. In 1889 two million cords of wood were consumed and in 1906 three and a half million cords; from Canada at that time we imported 739,000 cords. Newspapers were the main factors in this enormous depletion of forests. One New York daily used in 1907 nearly 39,000 tons or over one hundred tons a day. A single week day edition required the cut from eleven and a half acres and a Sunday edition the cut from nearly 30 acres. In 1919 the Forest Service made an estimate on the probable pulpwood supply of the country. It was calculated that in New England and New York there was sufficient to last for 17 years; in the Lake Shore District for 18 year; in Pennsylvania, Maryland, Virginia and North Carolina for 10 years. More encouraging was the calculation that in California, Oregon, Washington and Alaska the end was nowise in sight.

The Department of Forestry has undertaken plans to conserve the timber resources of the country by new planting and by economical and scientific cutting instead of the indiscriminate cutting that has prevailed in all times past. In several states the subject has been intensely agitated and legislature secured. In 1920 a decided movement for conservation and reforestation on an extensive scale and in a scientific manner was initiated and was gradually developing into an active national campaign. It is proposed to adopt a sound national policy to deal with the problem, the results of which may not be immediate but will remedy the situation before the famine that at present day threatens, has arrived. A bill em-



The Central Ohio Paper Company

TOLEDO COLUMBUS CLEVELAND

ORLANDO A. MILLER, *President and Treasurer*
A. M. MILLER, *Vice President, General Manager*
F. E. MILLER, *Vice President, Manager Fine Papers*
R. W. MILLER, *Manager Coarse Papers*
K. D. WOOD, *Secretary*

Makers of all kinds of papers reach the best markets through this old reliable house, with fifty years of progress back of it, with modern warehouses in three of the chief cities in the Middle West — TOLEDO, COLUMBUS, and CLEVELAND—and offices in Pittsburgh, Dayton, Detroit, Indianapolis, Akron, Wheeling, Huntington, and New York.

The Central Ohio Paper Company

Established 1872

FIFTY YEARS OF *COPCO* SERVICE

bracing the whole plan was introduced into Congress in the House of Representatives in 1920 by Congressman Snell of New York and a bill for the same purpose was introduced in the Senate.

Resources of Alaska

Meantime more and more consideration is being given to the resources of Alaska which are evidently limitless. On the Alaskan coasts alone, the interior not being taken into consideration, there are 20,000,000 acres of virgin spruce and hemlock containing 75,000,000,000 board feet of timber suitable for making pulp. Since 1905 these national coast forests have been under the care of the United States Department of Agriculture in the Forest Service Bureau. The forests are protected from fire and from unregulated cutting. Needs of the paper industry, present and future, are given special attention and the policy of sales of timber is so regulated that enterprises for the manufacture of pulp are assured a perpetual supply and need never have the shadow of exhaustion of resources hanging over them.

A pioneer in this field of endeavor is the Alaska Pulp and Paper Company, which, near the close of 1920, completed a groundwood mill and had under consideration of a second mill of one-hundred ton capacity. This plant is on the banks of the Speel River, one of the best locations in Southern Alaska, in the midst of an inexhaustable supply of pulpwood and near sources of transportation to the outside world. It is not far from Juneau. The mill is equipped with two four-pocket grinders and two wet machines and has a capacity of 32,000 tons a day. It has at command 30,000 to 40,000 horsepower of water. It had its first run of pulp in January, 1921, and its first shipment out was made in March following.

Pulpwood Relations With Canada

Our relations with Canada regarding pulpwood, pulp and paper have been a subject of constant consideration by American paper makers and of frequent international negotiations for a full third of a century. The steadily impending depletion of the pulpwood reserves in the United States and the enormous potential resources of the great forests of the British dominions to our north have constituted the fundamental basis of this controversy. Year in and year out, in some form or other, it has been conspicuously in the forefront. In the range and character of the discussions and investigations concerning it, in the varied political aspects that the case has assumed in the many efforts that have been made for a fair adjustment of the matter and in the material reaction upon the industry on both sides of the line, this has been a part of the history of the period second to none other.

News print has been the one branch of paper manufacturing around which this discussion has most revolved. As far back as 1900 or before some Americans began to look longingly across the border for pulpwood while on the other hand the Canadians were growingly impressed with the value of their properties industrially, commercially and politically. The trouble was seriously on early in 1900 when the Province of Ontario passed a law prohibiting the export of spruce wood as raw material and made compulsory the home manufacture of it into lumber or wood pulp. The Province of Quebec allowed pulpwood to be exported but laid a stumpage duty of $.90 per cord upon all timber that was cut. A rebate of $1.50 per cord was allowed in all wood cut and manufactured in the Province and thus there was an export duty of forty cents per cord sent out of the country. These provisions related only to wood on crown lands and not wood on land owned by private individuals.

A full digest of this affair carried to repletion at all points and covering all its aspects and effects, varied, far-flung and intricate, is not possible in this connection. It is practicable—and really no more is necessary—only to point out the main happenings in the long-drawn-out controversy and in general the resultant outcome of the international competition of which this was the conspicuous and potential part.

For a considerable time the plaints of American newspaper publishers against the prices that they were obliged to pay for news print, somewhat higher than they had before known had become a considerable factor in this case. Petitions for relief were made to the government, in the line of the prosecution of the so-called "paper trust" and for the repeal of tariff duties on paper and pulp. President Roosevelt, in his annual message in 1907 recommended to Congress that it should repeal the duty on pulp provided an agreement could be arranged with Canada that there should be no export duty on pulpwood from that dominion. Unfortunately the responsive move in Canada was for a higher export duty on pulp logs and even a campaign for total prohibition. At the same time there was talk of organizing American companies to manufacture in Canada and export the finished product of pulp into the United States. In Canada a main argument of grievence was that manufacturers of the United States went to Canada, bought timber land, cut trees, dressed logs, sent the logs to the United States free of export duty and from the pulp thus provided made paper which went into export in detrimental competition with the Canadian paper trade.

The Taft Reciprocity Fiasco

In 1910 the situation had become so acute industrially and politically between the two countries that consideration was given to the proposition for a general trade reciprocity. Commissioners were appointed by the two countries and they worked out an agreement that was put into the form of a reciprocity treaty and was submitted to Congress by President Taft in January, 1911. In this agreement paper, pulp and pulpwood were placed on the free list except when they came from countries that had placed an export duty on them. At that time pulp came into the United States from any country, free of duty or with countervailing duties; pulpwood was free and paper bore moderate duties. The reciprocity duty was passed by Congress and was signed by President Taft in July, 1911. It was rejected by the Canadian parliament but has ever since been working, though Canada has never ratified it, although periodical attempts have been made to have it ratified even as recent as 1921. One section of this measure was so framed that even with the refusal of Canada to accept the treaty as a whole pulp and paper valued at not over 2½ cents per pound was privileged to come into the United States free of duty. Promptly other nations claimed, under the favored nations treaty provisions, that they were privileged with Canada to have entry of their pulp and paper into the United States free of duty. Norway and Sweden were particularly insistent upon this right. Decision by the United States was against this contention mainly on the point that Canada is not a "country, nation or state" within the meaning of treaties.

The tariff act of 1897 provided for a countervailing duty in these terms: "That if any country or dependency shall impose a duty on pulpwood exported to the United States, the amount of such export duty shall be added to the duties herein imposed upon wood pulp imported from such country or dependancy." The United States considered that the Canadian rebate from its regular stumpage tax upon wood cut and ground into pulp in Canadian mills and not allowed on wood to be exported to the United States constituted an export duty in effect if not in name, and assessed pulpwood duties accordingly.

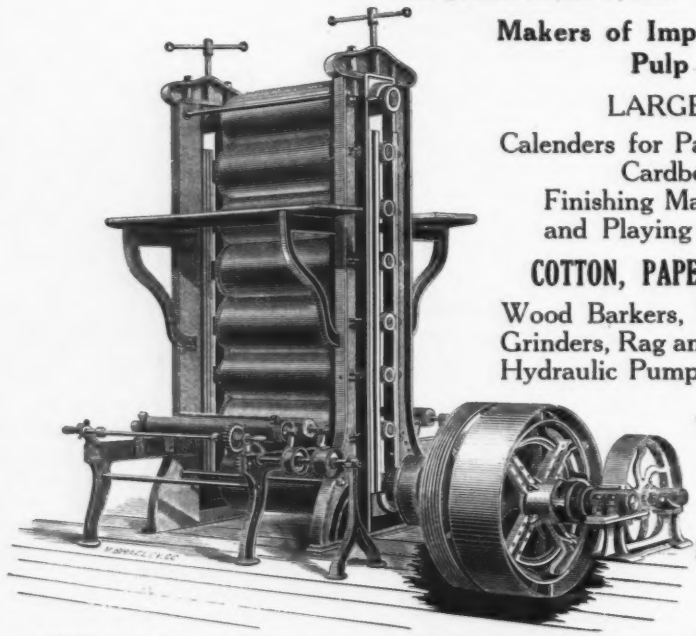
Effect of the Legislation

An immediate effect of this legislation was a decided injury to the industry in the United States and a reciprocal advantage to the paper-manufacturing interests in Canada. Importations of pulp and paper, in large part free of duty began at once in a measure to increase. In 1911 and in 1912 for the fiscal years ending March 31 paper exports from Canada were in value: All paper $2,075,089 and $2,086,304; printing paper, $1,962,832 and $1,989,863; chemical wood pulp, $1,298,162 and $1,585,615; mechanical wood pulp, $3,796,427 and $2,834,329; pulpwood, $6,092,715 and $5,697,901.

HOLYOKE MACHINE CO.

HOLYOKE, MASS.

Incorporated October 1, 1863



Makers of Improved Machinery for Wood Pulp and Paper Mills

LARGEST MAKERS OF

Calenders for Paper Mills, Glazed Paper and Cardboard Manufacturers
Finishing Machinery for Lithographers and Playing Card Manufacturers

COTTON, PAPER and CHILLED IRON ROLLS

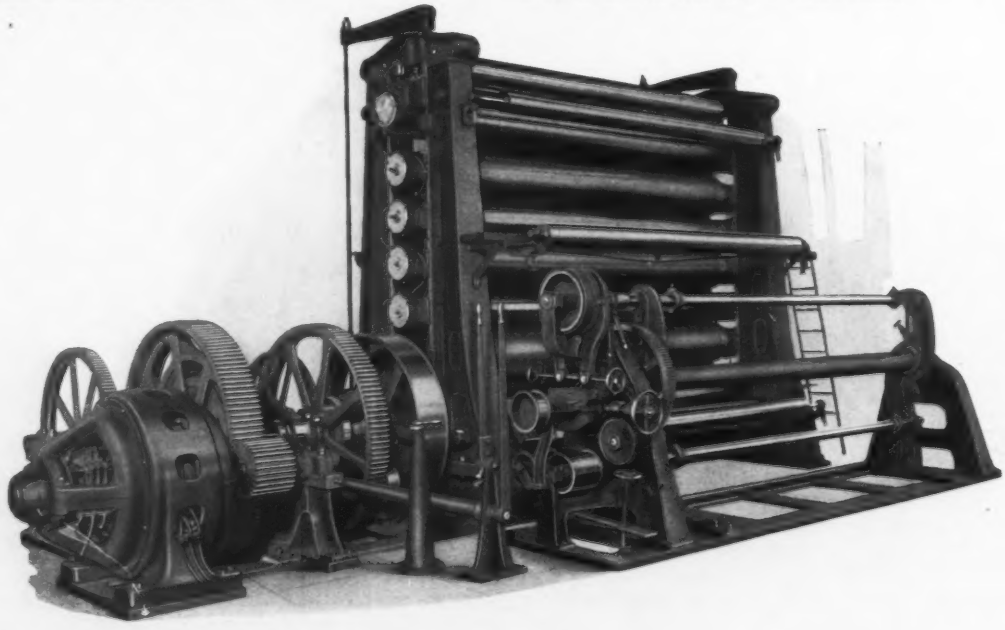
Wood Barkers, Wood Chippers, Wood Pulp Grinders, Rag and Paper Dusters, Rag Cutters, Hydraulic Pumps and Presses.

Washing and Beating Engines

Improved Beaters of Umpherston Type

ABOVE is an illustration from an original engraving of 36" Web Super Calender made FIFTY YEARS AGO by Holyoke Machine Co. and used in their Catalogue of Paper Machinery made by them at that time.

BELOW is a photo engraving of 140" Web Super Calender made in 1921. This calender has made a record of 61,000 lbs. of super calendered book paper within 24 hours, using about 75 H. P., which is believed to be a world's record.



Similar figures for 1913, 1914 and 1915 were: All paper, $9,390,144, $10,616,753 and $12,950,491; printing paper, $4,242,298, $9,818,539 and $12,126,982; chemical wood pulp, $1,995,817, $2,660,013 and $4,550,196; mechanical wood pulp, $2,580,462, $2,253,621 and $2,893,618; pulpwood, $6,806,945, $7,388,770 and $6,817,311. These yearly figures differ slightly from those in the United States reports for the reason that the fiscal year of the United States ends on June 30. During our fiscal year ending June 30, 1916 Canada exported to the United States paper to the value of $17,759,018; pulpwood to the value of $6,102,170; wood pulp, $10,793,647.

In 1911 pulp and paper concerns were incorporated in the United States and Canada to a capitalization amount of $57,460,000, of which those in Canada had $45,000,000. In the Canadian list was the largest number of pulp and paper mills ever projected in any one year before in that country. Thus beginning so it continued in the next ten years. The pulpwood and groundwood pulp industry has been steadily gravitating toward Canada.

While in the United States slightly less than twenty-nine per cent of all the mills—pulp and paper—were pulp in 1921, in Canada nearly eighty per cent were pulp. The one hundred and one pulp mills of Canada had a total capacity of over 8,680 tons a day, an amount fully up to the capacity of the three hundred and thirty-three pulp mills of the United States.

News Print Most Seriously Affected

News print has been most seriously affected by the situation, though the full force of competition with the Canadians was not felt for a year or two after reciprocity had begun. In the United States the production of news print was nearly at a standstill in the years 1913-1919, but Canada was making very substantial growth. In 1913 the production of the United States was 1,305,000 tons; there was a slight falling off in the next two years, an increase to 1,359,000 tons in 1917 and to 1,375,000 in 1919. During the same seven years the Canadian production was on the increase though not always uniformly. Beginning in 1913 with 350,000 tons, the upward move was to 808,000 tons in 1919—more than doubling or, to be accurate, about 130 per cent. The percentage of increase in the United States during this period was less than six per cent. From 1919 to 1920 the increase in the United States was from 1,375,000 tons to 1,512,000 tons, ten per cent, or slightly more than fifteen per cent for the seven years. In Canada the increase was from 808,000 tons to 883,000, a little less than ten per cent, or a little more than one hundred and fifty per cent for the seven years. In 1913 out of the total 1,655,000 tons by the two countries the United States produced seventy-nine per cent and Canada twenty-one per cent; in 1919, out of 2,183 tons the United States produced sixty-three per cent and Canada thirty-seven per cent; in 1920, out of 2,395,000 tons the United States produced fifty-eight per cent and Canada forty-two per cent. These figures strikingly show how, with that gross amount of increase from 1,655,000 tons to 2,395,000 tons, the Canadian proportion grew from less than one-quarter to nearly one-half of the total.

Developments in Canada

Latest developments in Canada have included the incorporation of the Belgo-Canadian Pulp and Paper Company of Quebec with a capital of $20,000,000 to make pulp and news; the Riordon Pulp and Paper Company merger with a capital of $10,000,000 to handle the enormous timber tracts and water power of the company, 25,000,000 cords estimated reserve of pulpwood, 1,200,000,000 standing feet of white pine and 168,000 horse power; and the St. Regis Paper Company, Limited, of Canada, subsidiary to the St. Regis Paper Company of Watertown, N. Y., with a capital of $1,600,000 to furnish pulp wood to the American paper mills of the company.

Only Two News Mills in U. S. in Ten Years

In the United States between 1911 and 1921 only two new mills for news print was built. The mill for the North-West Paper Company in Brainard, Mich., were erected in 1916 and the next one was that of the Manistique Pulp and Paper Company at Manistique, Mich., in 1919.

Government Intervention

Government intervention in the industry has been exercised in several ways in recent years. Of course the tariff has always been an effective instrument of government policy and as an outshoot of this we have had the reciprocity treaty with Canada. The Sherman anti-trust law has been frequently invoked and several times with decided results. The authority of the Federal Trade Commission has been brought to bear again and again, not always to the satisfaction of those who have been compelled to feel its power. During the European war the power of the government was used in emergency measures touching fuel, employment, transportation, distribution of product, and so on, that, burdensome as they were, yet were endured resignedly, if not always cheerfully, in patriotic spirit for the national welfare.

The Parks Pooling Plan

An early instance of this government spirit, so early indeed that it has become ancient and well-nigh forgotten history, was the case of the so-called "Parks Pooling Plan." This scheme, proposed by F. H. Parks, a business promoter, not a paper man, was an elaborate arrangement for the mills that should come into it to pool their production, sales, etc. It was first considered by some of the box-board men in 1899, the proposal being to combine the box-board interests of all kinds—straw-board, news board and pulp-board. Then the fiber and the manilla people were attracted. The idea was ambitious but the plans were unwiedly and from the outset doomed to failure, for so many conflicting interests could not be brought into enduring agreement, and outside competition also promptly developed. Then the United States authorities concluded to take a hand in the affair. Action was brought under the Sherman anti-trust law against the officials of the organization before their operations had gone far. The accused generally pleaded guilty, were fined $2,000 each and the association ordered to be dissolved. Parks went away to Europe and the paper trade knew him no more. Between 1908 and 1910 the Fiber and Manilla Association, the American Paper Board Association and the Eastern Box Board Association disappeared.

News Print a Storm Center

News print was particularly a storm center in later times. By reason of the war newspapers increased in size and circulation so that the demand for paper was increased, supply had difficulty in keeping up with demand and prices went soaring. Publishers were obliged by the imperative force of circumstances to cut size of papers and curtail waste in circulation, but meantime agitation had been stirred up against the news print manufacturers, who were attacked by the press and in Congress. The News Print Manufacturers' Association was accused of being an organization operating in violence of the Sherman anti-trust law. At the request of the Association an investigation into its affairs was begun in 1916 and a year later, in April, the case was presented to a Federal Grand Jury in New York. Indictments were returned against George H. Mead, Philip T. Dodge, Edward W. Backus, George Cahoon, Jr., Alexander Smith, G. P. Gould and Frank J. Sensenbrenner, the responsible members of the News Print Manufacturers' Association and representatives of some of the biggest news print mills in the country.

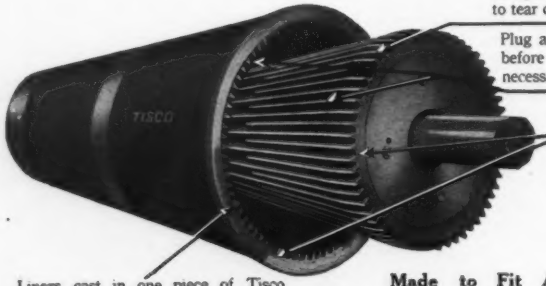
A Patriotic Duty

In November it was settled, the manufacturers pleading *nolo contendere.* One of the counsel for the defense, said in explanation of this action: "We have decided as a patriotic deed in this time of stress on this plea." Judge Mayer, of the Federal District Court, signed the final decree, and imposed nominal fines amounting in the aggregate to $11,000. The case against Gould was now discharged and the case against Mr. Smith was suspended as he was

END YOUR BEATER ROLL and JORDAN FILLING TROUBLES

TISCO MANGANESE STEEL

Tisco Manganese Steel has been used since 1892 to resist shock and abrasion in the wearing parts of Mining, Milling, Crushing, Excavating and Dredging machinery. It is hard but tough. A cast bar ½" x ¾", will bend cold 180 degrees without fracture. It is not commercially machinable with tools, but must be finished by grinding machinery. It takes a high polish and wears so slowly that the tackle remains practically unchanged.



Plugs cast in one piece of Tisco Manganese Steel No separate blades to tear out

Plug and liner machine ground to fit before shipping No "grinding in" necessary

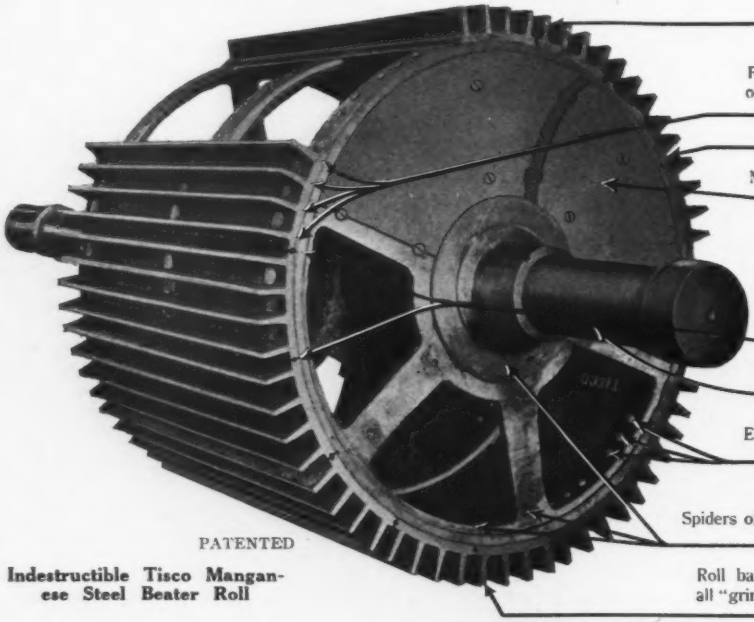
No wood filling

Knife details to suit your individual needs.

Easy to install. No changes required in your present engine.

Liners cast in one piece of Tisco Manganese Steel. No separate blades to tear out

Made to Fit Any Jordan. Guaranteed Economy



No wood fillings

Fly bars or blades cast integral in segments of 4 bars each of Tisco Manganese Steel

No bands or wedges

Machine fitted steel head easily removed

Space between segments tightly leaded to prevent leakage

Forged open hearth steel shaft

Each segment held in place by 9 heavy rivets

Spiders of special "Orbit Steel," cast in one piece

Roll bars ground to true circle, which eliminates all "grinding in" when dropped on bed plate

PATENTED

Indestructible Tisco Manganese Steel Beater Roll

Founded in 1742

TAYLOR WHARTON IRON & STEEL CO., HIGH BRIDGE, N. J.

District Sales Offices:

30 Church St., New York City
208 So. La Salle St., Chicago
1418 Oliver Bldg., Pittsburgh
730 Widener Bldg., Philadelphia
605 Insurance Exchange Bldg., San Francisco
Denham Bldg., Denver
522 Connell Bldg., Scranton
201 Devonshire St., Boston

absent from the country in war service in France. The fines were imposed upon the other five defendants. In this form of settlement it was practically established that such acts as the manufacturers were accused of were in violation of the Sherman anti-trust law. The News Print Association was dissolved. An agreement was entered into between the Federal Trade Commission, the United States Department of Justice and the news print manufacturers by the terms of which a maximum price of three cents for news was fixed for the period of January 1-April 1, 1918, with the proviso that if that price should not prove to be satisfactory it should be subject to review by the Federal Trade Commission for change, with a still further review by appeal, by either party to the controversy, to the United States Circuit Court of Appeals. What was even more important, in a broaded legal scope, was that by this adjudication, the Federal Trade Commission received recognition for the first time, in a court of law, as a price-fixing body and had its status and its powers clearly established.

Following the settlement of the case the Federal Trade Commission held hearings early in 1918 on the price of news print and fixed a price of $62 per ton for roll lots f. o. b. mill as of April 1. Court proceedings, under appeal from this decision, resulted in a revised price of $70 per ton being ordered. Important points in the decision of the Federal judges who heard this appeal were a recognition of the hazards faced by the mills at that time; of the large investments required for the business, and that fifteen per cent on the actual investment was a fair return. In coming to this last conclusion the judges found that a just valuation of the investment in a mill for manufacturing news print was $39,500 per ton of daily product, though this did not cover any allowance for the value of timber or for supply of wood from other sources; that the average cost of paper per ton in the United States and Canada, April 1, 1918, was $50.25; that the fifteen per cent profit allowed would amount to $19.74 per ton. An appeal from this decision was taken by the publishers to the Federal Trade Commission again and once more the case was reopened. The second decision of the Commission was for a price of $75.05 per ton in car lots from July 1. In 1920 at request of the publishers the United States Attorney General sought from the Federal Trade Association to know if the agreements had been carried out by the manufacturers; a prolonged Congressional committee hearing was carried on; several bills to encourage paper manufacturing and to restrain freedom in price fixing of news print were introduced into Congress; and there the matter ended.

Admittedly this government court action and the final measures of price fixing were exceptional procedures forced by the exigencies of the hour. But the case, more than that, was important in jurisdiction. It stands as another precedent of government powers under the Sherman anti-trust law and of the right of the government to exercise authority, through its courts and commissions, in regulating business methods and prices as the public necessity may at any time seem to be demonstrated.

The Technical Side of Paper Making

It has been within the range of the present quarter of a century that the superior importance of advanced technic has come to be more than ever recognized as an essential in paper making. The rule of the thumb may have answered for any reasonable demands in the days of little things, but it is no longer sufficient. Scientific knowledge and well-grounded technical training and experience are the imperative requirements in what has grown from a mechanical trade of restricted proportions to a profession of high degree. Responding to this need, schools for instruction have been started to prepare men for practical labor in the mills and in the end to supply the necessary advanced scientific knowledge to direct that labor.

For this purpose the University of Maine, at Ontario, in 1913 made the initial move, by introducing into its curriculum courses for the study of chemistry, forestry, pulp making and paper making. Instruction is now given in the handsome, well-equipped chemistry building of the University. The building has a special laboratory relating to pulp and paper and therein are several beating engines, a rotary rag boiler, two digesters, screens, paper testing instruments, microscopes and other appliances. The courses directly pertaining to paper making begin with the Freshmen on a four-year program. They include general chemistry, paper-mill machinery, wood identification, general forestry, cellulose, pulp making, paper making, industrial chemistry, paper problems, paper testing, hydraulics, bleaching, coloring and other subjects with the aim of giving the student a thorough knowledge of chemistry and a special training along all lines pertaining to pulp and wood.

In addition to this academic instruction the students can profit by actual inspection of pulp and paper mills in actual workings. The school has a particular advantage of location, being situated in one of the great pulp and paper centers of the United States. Within a radius of ten miles are the staple varieties of pulp and paper. These include the Eastern Manufacturing Company at South Brewer, the Orono Pulp and Paper Company at Orono, the International Paper Company at Orono, the Penobscot Chemical Fibre Company at Great Works, and the Nekonegan Paper Company at Old Town. All these mills are open to the students and the definite knowledge that they are thus able to acquire can easily be imagined. Graduates receive the degree of Chemical Engineer and they have become connected with some of the biggest paper manufacturing concerns in Quebec, Ontario, Maine, Massachusetts, New Hampshire, New York, Michigan and elsewhere.

In 1910 the United States Department of Agriculture, in co-operation with the University of Wisconsin, established at Madison, Wis., a forest products laboratory for investigation covering timber tests, timber physics, kiln-drying, chemistry, etc. One part of this work is directed particularly to pulp and paper. For this purpose the laboratory is equipped with grinder, barker, digesters, beating engine, screen, Jordan, a combination Fourdrinier and cylinder machine and other necessary appliances for experimenting in and studying groundwood problems in their relation to paper making.

How the Government Contributes

The United States contributes in other ways to scientific enlightenment regarding paper processes and products. In Washington there are two paper laboratories of the Department of Agriculture, one in the Bureau of Chemistry and the other in the Bureau of Plant Industry, and in the Department of Commerce the Bureau of Standards gives attention to the subject. The laboratory of the Bureau of Chemistry was started about 1900 and was formally organized in 1904 by Dr. Harvey W. Wiley, who was then at its head and who then remarked that:

"It is perhaps a little remarkable that in this country we have no government research institutions nor testing laboratories devoted to the paper, leather or turpentine industries. In this the United States is behind the nations of Europe, and with decreasing raw materials there is need of such laboratories."

This laboratory is now one of the most complete in existence in the country for paper testing. Since 1907 it has maintained an exceedingly valuable service in the publication of bulletins on various essentials relating to forestry, pulp making and paper making. The Bureau of Standards, organized about 1906, has done much efficient work in testing paper for the government and for private parties, making tests that have the valuable stamp of official determination as to durability and adaptability of particular papers for particular purposes.

Interest Shown in Other Schools

The New York State College of Forestry has a plant in Syracuse, connected with the Syracuse University. A small paper mill and a small pulp mill in charge of C. E. Libbey, professor of pulp and paper chemistry, are used for experimental work. In the paper mill are a one-pound and a twenty-five-pound beater, a refiner, a rotary and hand moulds; the widest sheet is eight inches trimmed.

Established 1842 *Incorporated 1887*

CHENEY BIGELOW WIRE WORKS

SPRINGFIELD, MASS.

FOURDRINIER WIRES
DANDY ROLLS
CYLINDER MOLDS

CYLINDER COVERING
A SPECIALTY

LARGE WIRE SIGNS FOR MILL ROOFS

BRASS, COPPER AND IRON WIRE CLOTH

OFFICE RAILINGS AND GRILL WORK

In the pulp mill is a sulphite digester, a soda digester and a wet machine.

Schools for instruction have been opened in connection with several mills, especially in Holyoke, Mass., and Appleton, Wis., for the purpose of training men from the ranks of the employees. The American Writing Paper Company in Holyoke had an experimental division in its Little Mt. Tom mill. The plant for experimental purposes has three 600-pound beaters, one 800-pound beater, a special 300-pound beater and a 66-inch combination Fourdrinier and Cylinder, capable of running a 24-inch web. The plant for experimental and educational purposes has a miniature equipment consisting of one ¾-pound and two 12½-pound beaters and one 4½-inch Fourdrinier making a 3½-inch web.

Private experimental establishments have attracted attention in recent years and their work testifies to the increased demand for technical knowledge and practice in the profession. That of Arthur D. Little in Cambridge, Mass., a well-equipped small mill run by electricity, has one 600-pound beater, one 30-inch combination Fourdrinier and Cylinder machine for a trimmed sheet of 24 inches, two 50-pound beaters, one Jordan, two washers and one rotary boiler. The establishment, which has a capacity of one hundred pounds daily, is devoted entirely to experimental work and the manufacture of acid-washed filter paper. In Stamford, Conn., is the experimental pulp and paper mill of Joseph H. Wallace, consisting of extraction, soda pulp, sulphate pulp and paper plants and a research laboratory for fiber examinations and development of processes.

American Paper and Pulp Association

The Technical Association of the Pulp and Paper Industry is an offshoot of the American Paper and Pulp Association. The latter association had its origin in several conventions of paper manufacturers after 1878 in a movement for co-operation in controlling production, the market and prices. Finally the Association was evolved on a social rather than a business basis exercising influence by the interchange of views among its members, relating to all conditions and problems of the industry. Practically all the leading men in the business were its members from 1878 to 1921. Among its presidents in that nearly half a century were William Whiting, Wellington Smith, William H. Parsons, Byron Weston, William A. Russell, Warner Miller, Augustus G. Paine, George F. Perkins, Hugh J. Chisholm, Person C. Cheney, Arthur C. Hastings, A. B. Daniels, George W. Knowlton, George W. Sisson., Jr.

As one of the oldest of America's trade associations, it is interesting to note the point of development which has been reached by the association. The association is a federation of associations, rather than of individual mills, and includes fifteen affiliated associations, constituted of groups of manufacturers making the various grades of paper, and also of the service associations, of which the Technical Association is one. Others of the service associations are the Cost, Salesmen's and Superintendents' Association. The American Paper and Pulp Association, as a general federation of the industry, is thus able to represent the entire industry in matters of general importance, while each group cares for the particular problems of that special membership.

The Technical Association

The Technical Association of the Pulp and Paper Industry includes in its membership executives, engineers, chemists and superintendents in all classes of paper and pulp manufacture as well as those in other lines of industry whose activities bear more or less close relation to it. According to the objects, it is engaged in stimulating interest in the science of paper and pulp making, providing means for the interchange of ideas and encouraging original investigation.

Under an arrangement with the Association, a Technical Association Section in the PAPER TRADE JOURNAL is conducted by the secretary, in which material of technical interest to the industry is published, as well as abstracts of papermaking literature throughout the world.

Besides the usual activities of an engineering society, the Association has been engaged through its Vocational Education Committee, in stimulating vocational education in the industry. Co-operating with a committee of the Canadian Technical Section, it has arranged for the publication of a set of textbooks on pulp and paper manufacture, in five volumes. Thus far the first two volumes have been issued and the third is expected in a few weeks. Co-operating with the Federal Board of Vocational Education and the various state boards, numerous paper mills have recently been carrying on foreman training conferences, following these by a program of vocational education.

Much credit for this work is due to R. S. Kellogg, secretary of the Vocational Education Committee.

In Canada the Forestry Branch of the Department of the Interior is active in research, investigation and experimental work. The Forest Products Laboratories are operated in conjunction with McGill University, Montreal. A pulp and paper mill of semi-commercial size is there fitted out for investigative work. The plant is equipped to make practically all grades and kind of pulp and paper for experimental purposes and the chemical laboratory is especially equipped for research work on wood and pulp. The machinery includes a single beater, a double beater, a baby Jordan, a four-plate screen, a 33-inch experimental paper machine, two wet presses, twenty dryers, a smoothing press, a tub-sizing vat, a machine glaze dryer, a calendar stack, a Carthage chipper, a sizing system, small sulphite and soda digesters and other appliances.

A. W. JACK CORP. TO BUILD NEW MILL

Announcement has been made that a $500,000 plant would be built in Lockport at once by the A. W. Jack Corporation, which since its organization on November 28, 1918, has shown wonderful growth. The concern makes asbestos mill board and air-self sheathing, as well as some specialties. In the new mill which, it is expected, will be in operation by December 1, an asbestos paper will be manufactured with the asbestos mill board.

The site for the proposed new plant comprises eight acres of land at Mill street and North Transit road where the present mill is located. It is an ideal spot because of railroad facilities. Both the New York Central and the International Railway companies have tracks in proximity and the Jack Corporation now uses them.

Five buildings, all connected as if one, will be erected, the construction to be reinforced concrete and brick. The largest structure will be the machine room, 200 by 47-6. Next in size will be the finishing room, 182 by 93-6. The stock room is to be 138 by 56 and the beater room 82 by 36. Two of the buildings, machine room and stock house, are to be 22 feet high. The beater room will have an additional eight feet in height, while the finishing room will be only 15 feet high. There will be a power plant, 55 by 46. The present plant is to be dismantled.

Modern machinery—the last thing in paper making—will be installed in the plant throughout, according to Mr. Jack. The plant will have the latest in all equipment and it promises to be a model institution, probably the best for its size in the country.

George F. Hardy of New York has the engineering contract. Bids for the construction work will be sought and the contract will be awarded to the lowest responsible bidder. The estimated cost is $350,000.

Construction of the new plant will begin about May 1 and work will be rushed till it is completed.

At first the plant will employ 50 men, but this number will be increased until it becomes one of the largest industries in the city.

The Jack Corporation is capitalized at $500,000 and the directors for the first year are A. W. Jack and William W. Campbell of this city, Eugene P. Greenwood, Elmer K. Weppner and Charles G. Valentine of Buffalo.

LOMBARD & CO.

INCORPORATED

PULP STONES

Boston - - 236-238 A Street

Montreal - Prince & Brennan Sts.

Development of Paper Making Machine in 50 Years

Nature of the Machine Not Allowing Builders to Experiment With New Ideas Kept Development Back for Many Years—By 1894 Machines Were Successfully Making News Print at 400 Feet Per Minute While a Number Are Now Being Operated at Speed of 1,000—Sheets of 1,500 Feet Will Probably Soon Be Reached, But This Will Call for Many Changes and Improvements Over Machines Now in Use.

Written Especially for the Anniversary Number by Clarence E. Kinne, Sec. and Mech. Eng. Bagley & Sewall Co.

The paper-making machines that existed fifty years ago were of very light construction, of narrow width, and ran at slow speeds. These machines were practically copies of the early machines that were brought into this country from England, and aside from a few slight changes they were nearly alike. Machines 48″ in width were very common, while there were a few machines 54″ wide, and a 60″ machine was considered a wide machine. Many of the smaller machine shops in the United States were building paper-making machines occasionally, and to their credit, some of these machines are still in operation at the present time. For many years 100 feet lineal speed per minute was considered fast for these machines, and, consequently, the light weight, the small journals, and the small diameter of dryers were sufficient, as the machines were not subjected to very great stresses.

The Open Belt System

Most of these machines were driven by what was known as the "Open Belt System." Crowning face pulleys were used on the various shafts driving back from one central shaft, which was driven by a steam engine or a water wheel. From this central shaft, belts led to the couch roll, the press rolls, the dryers and the calenders. When it was necessary to vary the speed of the various parts, this was done by wrapping lagging around the pulley, or taking it off, as the case might be. Later expanding cone pulleys were used in some cases for varying the speed of the various parts of the machine, but these were not satisfactory, as the interior mechanism was too complicated and soon became troublesome, due to delicate construction.

Jouffray System of Floor Drive

An improved system of floor driving was invented by Jouffray, Cadet & Sons, Paris, France, about 1875. This consisted of a pair of bevel gears driven by a cone face pulley. By moving the belt on this cone, the speed of the machine could be varied. Soon afterwards this arrangement, in an improved form, was introduced into the United States by George E. Marshall, of Turners Falls, Mass., and became known as the "Marshall Driving Train." Very soon after this a friction clutch was added to each cone pulley, so that each part of the machine could be started or stopped as desired. It was only a short step from the iron bevel gears to the use of mortise bevel gears, which could be run at a higher speed and were less noisy than the iron gears.

About 1873 the standard American paper machine usually had a wire about 33 feet long, built in widths from 86″ to 100″ wide, had two presses, seven dryers 36″ diameter, an eight roll stack of calenders, a revolving reel, a slitter, and a single shaft winder. In 1880 the widest machine in the United States had a wire 101″ wide and operated at a speed of 200 feet per minute, which was considered very high speed.

A peculiar condition has always existed in paper-making machinery which is seldom ever found in any other class of machines. The nature of the machine is such that the builder cannot experiment with any new or untried ideas before the installation of the machine, and when the purchaser receives the machine, he wants to begin making paper at once, and he will not experiment to any large extent nor allow the builder to do so. This kept the development of this class of machinery back for a good many years.

The Dawn of a New Era

About 1886 a paper manufacturer, who was a trained engineer, was dissatisfied with the paper-making machines which were offered him by the various builders, and he made designs for machines which he thought were an improvement over the existing types. He submitted his designs to two or more of the leading builders; but his ideas were so much in advance of anything that had ever been tried that these builders would not undertake to build the machines. Finally, after much persuasion on the part of the mill owner, one company offered to undertake the building of two machines, providing the manufacturer would pay for the new drawings, new patterns, the cost of the machines, and take the full responsibility for their performance. This he agreed to do, and the two machines were finally built and operated successfully at a speed of about 250 feet per minute.

This was the turning point, and from then on the advance was more rapid. The heavier construction and better distribution of the metal overcame the vibration and higher speeds were possible. This machine had a Fourdrinier wire 112″ wide by 50 feet long, and had fifteen dryers, each 48″ diameter. This was the first time that dryers 48″ in diameter had been used. Upon this machine the couch rolls, press rolls, and felt rolls, were much larger in diameter than anything used previously, with the corresponding larger diameter journals and other parts in proportion. This machine was the first one to have a small dryer, known as a paper receiving dryer, to carry the sheet of paper from the second press to the dryer section.

Another machine was built in 1890 for the same paper manufacturer, which contained many improvements upon the above described machine, and this new machine operated at 325 feet per minute. By 1894 machines were making news print successfully at 400 feet per minute.

Overhung Drying First Used

About 1894 was the first time that the overhung dryer was used on the calender end of a dryer section, and this was necessary in order to pass the sheet of paper more easily into the calender stack.

A paper machine was built in 1896, having a wire 160″ wide. This was the widest machine built up to that time; but on account of the roll journals being too small in diameter, and the driving train gears being too small, it was impossible to run this machine more than 300 feet per minute until it had been altered and rebuilt.

A few machnes were running during 1897 between 450 and 500 feet per minute. Up to this time one of the most serious difficulties encountered on so-called high speed machines was the difficulty of winding hard rolls, due to the fact that the winders then in use did

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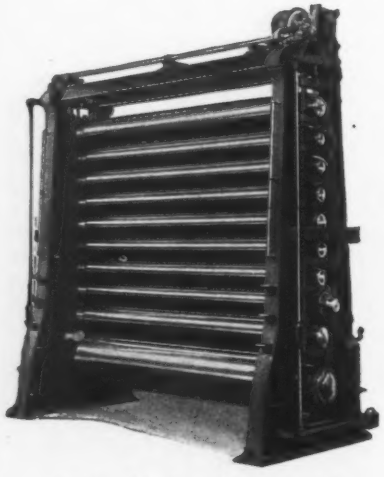
QUALITY-PRODUCTS



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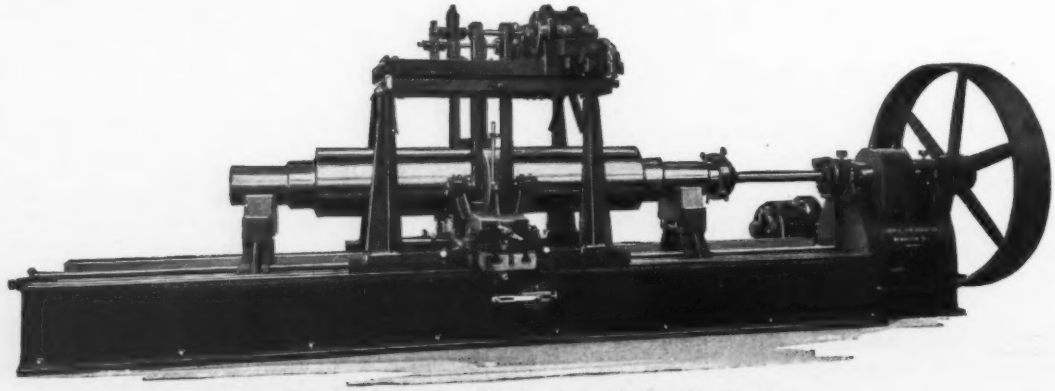

Roll Grinding Machine Showing Automatic Crowning Device

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not support the roll of paper properly, allowing the wound roll to sag in the center, and, consequently, the various rolls on the winding shaft had a tendency to become imbedded in each other, and in breaking them apart, it left ragged edges on the finished roll.

The First Two-Drum Winder

The first two-drum winder was built and installed about 1898. By the use of two drums, the roll of paper was supported its whole length; and by the use of a spreader attachment, the edges of the wound rolls were separated, overcoming the difficulty of having the rolls run together. The floor cone gears and pulleys had been mounted upon separate and independent stands up until about this time; and with the higher speeds and greater powers put upon these moving parts, the bevel gears had a tendency to back away from each other.

About this time the bevel gears, with bearings and pulleys, were mounted on a continuous cast-iron base, and this overcame the difficulty from the thrust of the gears and was a great step in advance. Paper machines had been driven by either hydraulic turbines or steam engines up to this time. In a few cases the variable line shafting had been driven by electric motors direct connected to the line.

First Installation of Electric Motors

The first installation of electric motors direct connected to the couch roll, press rolls, and other parts of the machine, was made about 1906. This was a new and untried method, and it was several years before this problem was solved successfully.

For many years the paper manufacturers seemed anxious to buy the cheapest paper machine that could be built, and were unwilling to pay for quality. This attitude held the paper-machine designers and builders back for many years.

The Day of the Consulting Engineer

In these days the most of the mills were designed and built by some local millwright. It was not until consulting engineers were called in to design the mills that the paper manufacturers were brought to see that it was to their advantage to buy better and more expensive machines, if they desired greater production of paper at a less cost. The consulting engineers then prevailed upon the paper-machine builders to design better equipment. The builders were only too glad to respond. Then came better and improved design, and, consequently, more expensive machines.

At the present time, the average paper manufacturer is looking for the quantity of production and the low cost of maintaining the machines, rather than the purchase of a cheap machine with its consequent troubles.

Increasing Speed of Machines

With the increased speed of the machines, many experiments had been made upon passing the paper automatically through the various parts of the machine. In 1914 the Sheahan Automatic Paper Carrier was perfected, and solved this problem as far as the dryers themselves were concerned. About 1919, a system where compressed air is used, passes the paper automatically from the couch rolls to the reel. In 1917 two machines were built in the United States, having wires 204″ wide, and which operated successfully at 750 feet lineal speed per minute.

The goal for high speed had been set at 1,000 feet per minute, and while this speed had been approached, it had never been successfully reached and maintained until 1920. Since that time this speed has been exceeded, and there are now several machines running in the United States and Canada regularly at a speed of from 900 feet to over 1,000 feet per minute.

The most successful high-speed machines at the present time are driven by direct-connected electric motors. These motors and their connections have been so perfected that a uniform speed is maintained constantly. The widest machine in operation at the present time is one having 232″ wire.

Many experiments have been made and there is still much controversy as to whether the breast roll of the Fourdrinier part should be given a high pitch, or whether the wire should be pitched up a moderate amount with a medium height of slice, or whether the wire should run level and very high slices used. Both of these arrangements have their advocates. The arrangement with the level wire and high slice seems to give a better formation of sheet at the high speeds.

High-Speed Machine of Today

The high-speed machine of the present day usually has a Fourdrinier wire 164″ or wider, and this wire is usually 100 feet long. The breast roll is from 18″ to 22″ in diameter, according to the width; and the table rolls are 6″ to 8″ in diameter. The bottom couch rolls are from 28″ to 30″ in diameter. There may be three or four sets of press rolls, and the bottom rolls are 28″ or 30″ in diameter. The dryer part may consist of thirty-six or forty dryers 60″ in diameter, or possibly thirty dryers, each six foot in diameter. One ten-roll stack of calenders, with the bottom roll 28″ or 30″ in diameter. The uniform speed reel, the slitting machine and two-drum winder. While suction couch rolls have been in use for some years on book machines, their use on the high-speed news machines, both for couch rolls and first press rolls, are rapidly coming into use.

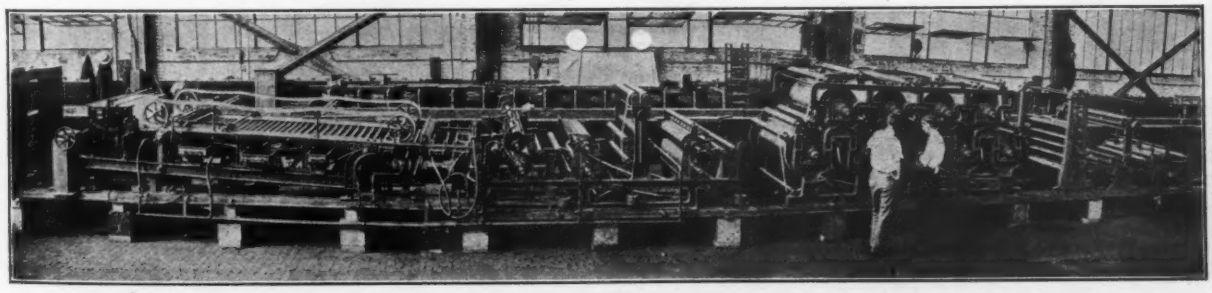
1,500 Feet Per Minute Soon

During the development of high-speed newspaper-making machines, for approximately each 100 feet in increase of speed there have been new problems brought up that did not exist on lower speeds, and as the speeds increase above 1,000 feet per minute, there are still other problems that face the designer and operator.

Speeds of 1,200 feet and 1,500 feet per minute will probably be reached within a comparatively few years; but these speeds will call for many changes and improvements over the best machines now in use.

BEAVER BOARD EXTENSION

The reorganization managers of the Beaver Board companies announced last week that it will be impossible to complete the proposed plan of readjustment of the indebtedness by April 1 as contemplated, and the committee representing creditors holding obligations that mature April 1 have requested an extension until April 29. More than three-quarters of the creditors have assented.



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The Story of Ground Wood Manufacture

History of the Beginning of the Industry in Europe Is More or Less Traditional, But It Was Started in This Country More Than Half a Century Ago by the Pagenstecher Bros. in a Mill at Curtissville, Mass.—To Warner Miller Is Credited the Idea of Running the Stock Over a Wet Machine to Facilitate Process of Preparing It for the Market Reasonably Dry—Great Expansion in the Industry.

Written Especially for the Anniversary Number by A. G. Howland, Vice-Pres., Wood Grinding Service, Inc.

The early history of the groundwood industry is shrouded in so much of a haze that he who would attempt to write thereof, setting down in chronological order the events incidental to its development and growth, must of necessity depend to a great extent on that which has become traditional. Though the industry is merely as old as the span of one human life and there are those living today who by years antedate it, yet by reason of the fact that so little of what transpired in those earlier years was committed to the printed page the chapter which would have proved most interesting is lacking in many details. Reference is here made to the inevitable succession of triumph and defeat experienced by the inventor, groping his way along in an effort to produce by mechanical means from the cheapest raw material known at that time, i. e., a block of wood, the sort of fiber which would prove an acceptable substitute for the already scarce and high priced rag stock.

The earliest date at which anything at all similar to groundwood pulp was even thought of as a possibility, according to one authority at least, establishes the fact that as early as 1756 Dr. Schaeffer of Bavaria conceived the idea of making pulp for paper from sawdust and shavings by a mechanical process. His efforts were not successful, it is explained, owing to the lack of suitable machinery. As no details are given regarding the good doctor's idea of just what machinery was required to make his process successful and as since that time nobody has appeared with sufficient inventive ability to devise machinery suitable for this purpose, we must conclude this mere conception of an idea does not constitute invention nor entitle its originator to claims of priority.

Voelter's Patents

Approximately a century elapsed between the mythological effort of Dr. Schaeffer and the appearance of the man who was later to be credited with having been the originator of mechanical pulp. At that time, exact date not available, Friedrich Gottlob Keller while strolling through the forest is said to have observed a deserted wasp nest and on giving it close examination discovered that it was composed of small fibers of wood, knitted together like coarse wrapping paper. After making some crude attempts to reproduce such fiber by rubbing a block of wood on a stone, he sought the aid of Henry Voelter, a paper maker and machinist who applied himself to the problem so successfully that he not only discovered the best method of grinding fiber similar to that of the wasp nest from wood but devised the machine by which it was to be done. So today where Keller is practically unknown Voelter's name is commonly associated with the first successful manufacture of mechanical pulp, and it was he who took out the first patents covering the process. The dates on which the original patents were issued are unknown to the writer, but authorities at hand agree that in the early sixties English and American patents were secured, the American issues being twice renewed so that it was not until 1884 that the Voelter patents finally expired and the process became open to public use.

Pagenstechers Established Industry Here

The original Voelter grinder is described and illustrated by a writer of that day as a vertically placed grinder, on which were placed five pockets for wood blocks, a screw feed, a screen and series of refining cylinders and an ordinary mill stone for reducing the coarser particles. It would seem that this new process was used successfully in Germany for about ten years before any particular interest was aroused in this country. It is a matter of record that the Voelter machines were shown as a working exhibit at the World's Exposition in London in 1862 and again in Paris in 1867 without attracting more than casual attention, but it was not much later when the Pagenstecher Brothers imported two of these machines to America. Securing a water power at Curtissville, Mass., they proceeded to build a mill and install these machines. This was accomplished during the winter of 1866-7 and on March 5 of the latter year, the first pulp was produced. Frederick Wuertzbach, who accompanied the machines from Germany, superintended the erection of the mill and equipment and naturally became its superintendent, and to him undoubtedly belongs the distinction of having made the first groundwood pulp in America. To the Hon. Wellington Smith also is conceded the equally distinguished position of having been the first to convert this news pulp into paper.

Interesting Sidelights.

As an interesting sidelight on the current opinion of the day, it is stated that Smith Paper Company kept the fact that it was using this pulp entirely to itself. That this course was the only prudent one is evidenced by the almost universal prejudice existing in the minds of paper makers of that day, whose opinion of the new material may be judged by the expression of one of the most prominent paper mill owners, replying to a solicitation that he invest some money in the new process, "Mr. Pagenstecher, we shall not take an interest in shoddy."

It is rather an interesting commentary on human nature and the workings of the human mind that of those who became associated with the Pagenstechers in this enterprise, the greater number were not paper makers. It is also worthy of note in passing that there were numerous cases of attempt to evade the Voelter patents and that a royalty of $5.00 per day was charged for license to operate each machine, the output of which did not exceed 1,500 lbs.

Ground Wood Drops in Price

Groundwood during the period which followed dropped in price from 8 cents which was the initial price to 5 cents or 4 cents, at which price it remained for a long time—presumably until the expiration of the Voelter patent. From about this period the name of Warner Miller becomes inseparable from that of this industry, and such was his zeal and success in promoting the manufacture and use of the material, through his influence as a member of Congress and otherwise, he became known as "Wood Pulp

1864 1922

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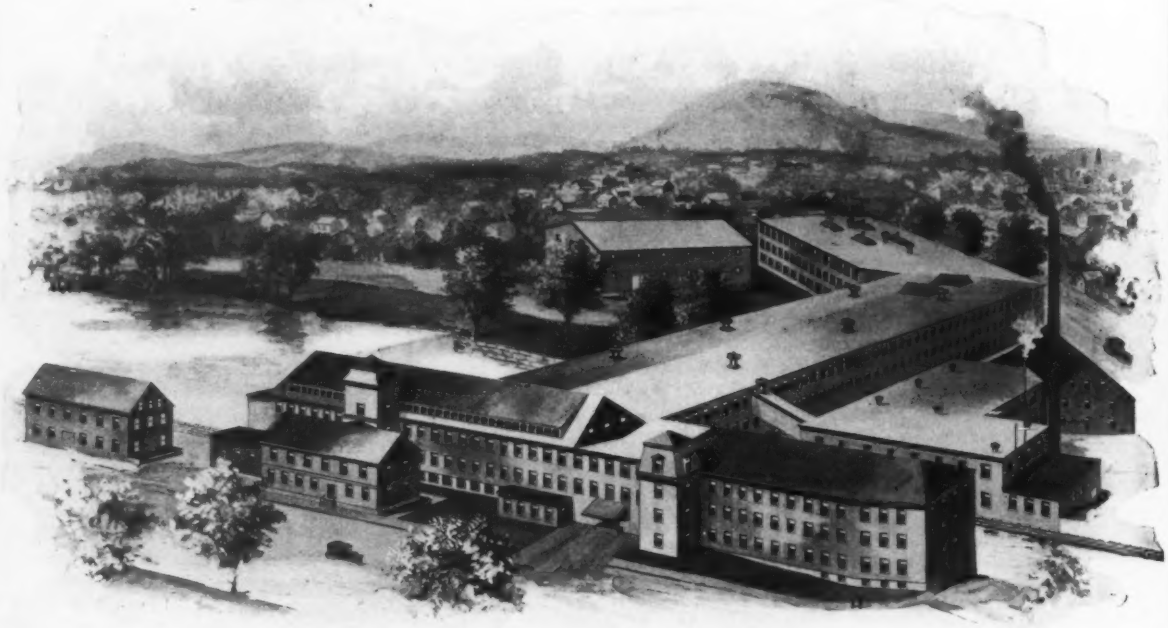

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Miller." To him is credited the idea of running this stock over a wet machine in order to facilitate the process of preparing it for market, reasonably dry.

Build Pulp Machines for Warner Miller

Speaking in a strictly local sense, the history of wood pulp and its appurtenant machinery began in 1871, at which time copies of letters existing in the files of the Bagley & Sewall Company show their concern then building for Warner Miller two pulp machines. These were to be shipped to Lyons Falls, N. Y., and it is believed they were later erected in the mill at Kosterville. The price on these machines was $250.00 each.

Within another decade the early prejudices against this new pulp having been in a measure proven erroneous, its adaptability for news print particularly having been demonstrated, we find the trade becoming prosperous and with the advent of new men, energy and capital, the plans of its promoters became more ambitious and large concessions of water rights being sought on which were erected mills of much greater capacity than any heretofore attempted, the mill at Palmers Falls, N. Y., and that at Turners Falls, Mass., being examples.

There is good authority for the statement that as early as 1869 A. D., Remington of Watertown, N. Y., installed in the Sewall Island mill the first wood grinding machinery used locally, and in this mill it is claimed was made the first sheet of new print composed exclusively of groundwood and sulphite. This distinction is also claimed for the Outterson mill at Brownville, N. Y.

Pretty Well Established in 80's

During the 80's the industry having become pretty well established as a factor in paper making, though confined to a comparatively small area, expansion became the watchword and new mills were being projected at points considered favorable through the combined proximity of wood and water power. Grinding machines, following the expiration of Voelter's patents and the introduction of American genius, became more perfectly adapted to the work.

In 1885 we note the passing in new construction of the old screw feed as applied to grinder pockets, the improved hydraulic feed taking its place.

Minor Inventions

During the latter several years, there has been brought out from time to time what may be referred to as the minor inventions of the trade, each of such a character as would render its use of great assistance to the pulp maker. Among these should be mentioned the various tests which are applied for the purpose of determining at the instant it is ground whether the product of each grinding unit is at grade with the others and entirely suitable for the quality of paper desired. Among these we note the photo-microsopic test by which the freshly ground particles of pulp magnified by many diameters can be visualized and its qualities judged, also the freeness or sedimentation test by which through the simple expedient of timing the retention of a certain amount of water by a given amount of pulp thoroughly mixed, or by another method measuring the overflow, it may with a good degree of certainty be determined whether the stock being made will prove "slow," "free," or "medium."

It has also been learned within comparatively recent years that the matter of maintaining a higher temperature than formerly was distinctly beneficial, not only to the product but as an aid in securing maximum production, and today we believe very little pulp is being ground cold in this country.

The magazine grinder was brought out by Vorth in Germany in 1912. Two of these machines were installed in Cliff Paper Company at Niagara Falls in 1913. In the following years practically every new pulp mill development has used this type of equipment.

The tendency toward more or less automatic operation together with increased size of units to lower cost of operation is shown in the development in the continent of the magazine grinder on the continent and its introduction shortly afterward into this country.

Stone Sharpening and Ideal Speed

Further during these latter years, there has come over the pulp grinding trade a realization that in the jigging or sharpening of the stone in co-ordination with ideal speed and proper pressure lies the secret not only of production but in a more marked degree the secret of quality as well. A very recent paper, read before a meeting of paper mill superintendents by a man whose opinion we are bound to respect, stated in effect that in the final analysis the quality of the pulp depended on the man who sharpened the stone. In this connection notice may properly be given to the improvement made in the last eight or ten years in these very essential accessories of the well conducted pulp mill—burs, or jiggs as they are sometimes called. The present refinement attained in construction of these tools marks a distinct advance from the time when any style, no matter how crude, was considered good enough for this purpose, and the savings effected through the intelligent use of stone sharpening tools of the most approved design are scarcely short of startling.

The Roberts Brothers, sons of one of the pioneer pulp grinders and machinery designers, have been instrumental in bringing about improvements in this line and to them must be given the credit for the shell bur, now in almost universal use, as well as various other ingenious devices pertaining to pulp mill practice.

Credit to Geo. C. Sherman

As this article is not supposed to be a dissertation favoring one method or against another, the writer hesitates to speak concerning the system of stone sharpening with which he has for several years been identified. However, the true chronicler must not for any reason personal or otherwise ignore the part played by the late George C. Sherman, who by his zeal and energy in promoting this system, both by precept and example, did much to elevate the average quality of groundwood pulp, nor can we fail to admire the courage with which in the face of long standing prejudice he proceeded to demonstrate its entire suitability, without the aid of any other fiber, for the manufacture of news print.

What of the Future?

So much for the past, but what of the future? Can it be by any chance that we who have witnessed the rise of this important industry, its unparalleled growth from nothing or next to nothing, an idea only, to its present position in which by virtue of its inherently sound economic principle it has become the dominant factor in a trade which takes rank as seventh among our national industries, may yet live to see its decline?

A due regard for the veracities, taking into consideration the ordinary expectation of human life, seems to compel an answer in the affirmative unless through a careful conservation of the remnant of forest we now have and through reforestration on a scale hitherto not attempted, we shall succeed in forestalling a situation which can only be described as a national disaster.

NEW WATER PIPE FOR PULP MILL

The forty-ton groundwood plant at Fort William, which was purchased some time ago by the Consolidated Water Power and Paper Company of Wisconsin Falls, Wis., for $175,000, will soon be put in operation. A new water pipe has been laid from the mill to the lake. It is of 24 inch diameter and 700 feet long and will provide water for a mill of 100 tons capacity. The Consolidated Water Power and Paper Company has purchased the Point Magnet limits for $85,000 from the former Kaministiquia Pulp and Paper Company. These limits are at the point of the Black Bay peninsula and comprise, according to the last cruise made, 70,000 cords of spruce in addition to other timber.

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PITTSFIELD, MASS.

MANUFACTURERS OF

PAPER MAKING MACHINERY :-: MECHANICAL ENGINEERS

LEITH WALK SCREEN

Development of the Sulphite Process

First Sulphite Mill in the United States Built by G. N. Fletcher at Alpena, Mich., in 1887—This Was a Mitscherlich Mill Which Is Still in Operation—In 1889 the Sulphite Mill at Palmer Falls, N. Y., Was Built by E. Meurer Who Deserves Much Credit for His Pioneer Work in the Industry—Since Then the Industry Has Grown Very Rapidly Until Yearly Production Is Now Two Million Tons.

Written Especially for the Fiftieth Anniversary Number by O. L. Berger, of the G. D. Jenssen Co., New York.

It is, of course, impossible to give any really comprehensive account of the history of the sulphite process in a short article of this kind, neither would I be the right man to write such a history. I will, however, give a few dates and names as I have found them in the altogether too scant literature we have pertaining to this industry.

Sulphurous acid (SO_2) was first used in papermaking about 1830 by L. Piette for bleaching straw, proving the properties of this chemical to dissolve incrusting material. In 1851 the Englishman Peter Claussen was granted an American patent on a process for the manufacture of straw pulp by soaking the straw in alkali and exposing the wet pulp to the actions of SO_2 gas. This was really a sodium sulphite process, but I don't think it ever was tried on a commercial scale.

On November 5, 1867, the American chemist, C. B. Tilghman, was granted U. S. patent No. 70,483 on a process for the manufacture of pulp from wood by cooking it with a solution of bisulphite of calcium or other bases. Tilghman discovered this by a mere accident. He was experimenting with fats and found that when he used SO_2 the wooden tubs containing the mixture would be attacked. This led him to further experiments, which were so successful that he finally built a small plant at the paper mill of W. W. Harding & Sons at Manayunk, Pa., in 1865. He first used a watery solution of SO_2, but found that the sulphuric acid which was formed would attack the fibers, and to avoid this he added lime to neutralize the acid. This was the first step in the right direction and must be regarded as the fundamental principle of the sulphite industry. Tilghman could, however, never overcome the mechanical difficulties and died a poor man after spending all his money trying to perfect his new process.

We next hear of the sulphite process in Sweden, where C. D. Ekman started to experiment on cooking wood with magnesium bisulphite solutions at Bergvik in 1872. He was more successful than Tilghman, and in 1874 he was actually producing sulphite pulp on a commercial scale and selling it to paper mills. His first mill was equipped with eight small digesters, and the fact that these digesters were in operation for twenty-two years, producing 100 tons of pulp per month, is a proof of the successful solution of the process. To C. D. Ekman belongs the honor of first producing sulphite pulp as it is known today.

Simultaneously with Ekman, experiments were also carried on in Germany by Dr. Mitscherlich. He did not succeed as well as Ekman and did not produce pulp on a commercial basis before 1880 by the so-called Mitscherlich process, which then was very successful.

All three men named above used the indirect method of cooking. The direct or quick cook method was developed by Ritter and Kellner in Austria. Their process, the so-called Ritter-Kellner, was perfected in 1884 and won great favor by its simplicity and was introduced very rapidly both in Europe and America, and is really with a few modifications the method used by most mills today.

The two Swedish engineers, Franke and Flodquist, must also be remembered for their pioneer work, as they did much to develop methods and machinery which in many cases are used today.

The first sulphite on this continent was made at Cornwall and Merritton, Ont., by Captain Ellis. He built these two mills in 1885, according to the quick cook method, and both mills ran successfully for many years.

The First Mill in U. S. A.

G. N. Fletcher built the first sulphite mill in the United States at Alphena, Mich., in 1887. This was a Mitscherlich mill, which is still in operation. The erection was engineered by August Thilmany, who in 1885 had secured the Mitscherlich patents for this continent. These patents were in 1887 sold to the International Sulphite Fibre and Paper Company, Detroit, Mich., for $250,000, and this company charged a flat royalty of $10,000 to all Mitscherlich mills it built.

In 1889 the sulphite mill at Palmer Falls, N. Y., which now belongs to the International Paper Company, was built by E. Meurer, now president of the Central Paper Company, Muskegon, Mich., for Mr. Pagenstecher. Mr. Meurer has done much to develop digester linings and mill equipment and deserves very much credit for his pioneer work in both the sulphite and later the sulphate industry.

Since that time sulphite mills have sprung up like mushrooms, and the quick growth of the industry can be understood from the fact that in 1900 the yearly production of sulphite pulp in the United States was 400,000 tons and now is nearly two million tons.

Development of Equipment-Woodroom

The first mills cleaned the wood by hand, bored out knots and sawed the blocks into discs that were loaded into the digesters by hand. The disc method was soon changed for chips, which first were cut with a guillotine axe, operating like a pile driver, cutting a slice for every stroke. As the mills grew in size, labor and time-saving machinery was developed, and an old-timer would hardly recognize a modern woodroom with its automatic slasher saw, barking drum, conveyors, splitters, and high-efficiency chippers, chewing up wood at the rate of one cord every four minutes.

Acid Plant

Acid making was one of the hardest nuts to crack, and the early operators had to swallow much "stink" in their primitive acid plants. The early manufacturers used limestone systems of the Mitscherlich tower and chamber type. Flodquist was the first to use the milk-of-lime system, and this method was well received in this country, where men like McDougall, Burgess, Stebbins, Drewsen, and Barker developed the milk-of-lime method to high efficiency. Lately the Jenssen limestone towers are finding general use both here and in Europe. The modern sweet-smelling acid plant is indeed a vast improvement over the "hell hole" of olden days.

THE formation of our partnership in 1858—sixty-four years ago—insures us a position in the 50th anniversary number of the Paper Trade Journal. From time to time in the past our mill has been extended as the demand for "Hamilton" felts continued to grow. At present we have under construction an addition to our manufacturing plant, 88 ft. x 292 ft. in size and 3 stories in height, which will be equipped with modern woolen machinery for making felts for the widest paper machines. This proposed increase in capacity is intended to enable us to fill orders with promptness when the paper business again assumes normal conditions.

Shuler and Benninghofen,
Miami Woolen Mills,
Hamilton, O.

Digester-Building

The first practical digester as used by Ekman was a lead-lined upright tank that could be tipped for emptying like a Bessemer converter and was heated with a steam-jacket. Mitscherlich used horizontal digesters lined with lead and brick and heated by lead coils. Later we have Franke's horizontal rotary lined with lead, and the Solomon-Bruggner's upright stationary, which was heated with a jacket and depended on a natural coating of calcium-monosulphite from the acid for protection of the shell.

Some mills also put in bronze digesters, but several bad accidents from explosions soon stopped their use. The Ritter-Kellner process used upright stationary digesters heated with direct steam. It is interesting to note the development of these digesters from the small pots holding one-half ton of pulp of the first mills, to the giants of today with capacities of fifteen, twenty and even thirty tons. These modern digesters, erected in place and lined with acid-proof brick laid in acid-proof mortar, are wonderful examples of modern engineering and are probably good for all times if the lining is taken care of properly.

I doubt that we really know much more about the reactions taking place inside the digesters during the cook than did Ekman and Mitscherlich fifty years ago. Experience has, however, taught us much and the modern digester with the recording flowmeters, thermometers, and pressure-gauges and excellent equipment all through, together with standardized methods of digester operation, is such an improvement over the ones used even ten or fifteen years ago that it really seems a wonder to us that the earlier mills could produce pulp at all.

The sulphite engineers are all working on improved methods to make the cooking operation automatic, to save steam and increase the yield and strength of the pulp. When we realize that the majority of the improvements so far have been in equipment rather than methods, it certainly seems reasonable to anticipate further improvements in the future.

Wet Room

The early methods used for cleaning and handling the pulp were, of course, very crude, but the machines used were nearly of the same principle as used today. The modern knotter, rotary screens and screen plate fasteners for flat screens are of recent date, and so is also the modern wet machine, which is able to turn out forty tons of pulp of 55 per cent air dry test per 24 hours without the use of felts.

Bleaching

The early attempts to bleach sulphite pulp was done by chlorine gas generated at the mill from manganese dioxide salt and sulphuric acid. The moist pulp was placed in closed acid-proof chambers and exposed to the direct action of the gas.

Later bleach powder solution was mixed with the pulp and the bleaching took place in tanks of various construction, either in batches or continuously. The Bellmer is probably the best known bleach system, but the tendency today is to bleach cold with a high consistency of the pulp, and we can expect to see some very great improvements along this line before long.

Many mills have installed electrolytic plants for the manufacture of their bleach, and this has proved very satisfactory for larger installations, while small plants still use bleach powder or liquid chlorine.

A Few Sidelights on Sulphite Mill Operation

In these days of efficiency it is probably irrelevent to ask the sulphite manufacturers on this continent the direct question, "Are you operating your sulphite mill as efficiently as your paper mill or your boiler house?"

In putting this question to them, I am doing it for the simple reason that I have had an exceptional opportunity during the last few years to get an insight on the operation of very many mills, and that this opportunity has given me a chance to compare the practical operation with the results obtained. This is not meant as a criticism, but rather as a plea for a more earnest effort to elevate the sulphite industry to the same plane on which the paper manufacturers run their other departments. With their permission I shall therefore endeavor to point out a few of the essentials that in my opinion are overlooked by some mills, at the same time giving full credit to the many mills that are really getting excellent results.

I think the word "chemical" as applied to sulphite pulp has done much to hurt the industry for the reason that so many mills have forgotten that the "chemical" end of it is so very simple and that the practical operation of all departments like the woodroom and wetroom is really of fully as much importance as the chemical testing of the acid.

In very many mills the chemist, if they have one, is turned loose in the sulphite mill and supposed to do his worst. The acid plant is especially picked on and carefully guarded against SO_2 and God knows what. I am talking from experience as I have had the pleasure of being a chemist in a paper mill myself for several years.

If I had a mill of my own I would tell my chemist to go out in the woodroom and study the operation of making chips, as I am convinced that correct chips are fully as important as a correct acid, and much harder to obtain.

Chips

My first plea then is for uniform chips free from sawdust and slivers. In order to obtain this it is necessary to feed the chipper to full capacity so the wood is not allowed to bob around in the spout. The knives and bedknife should be kept sharp at all times. It pays to shut down the chipper a few minutes and sharpen up the knives with a file every two hours. The bedknife should be changed as often as the cutting knives, bearing in mind that no one thinks of sharpening one blade of a pair of scissors and not the other. My experience has been that 200 r. p. m. is the best speed to run a chipper, but if the spout is kept crowded this can be increased.

After the chips are cut they should be screened immediately, and the tailings run through a crusher and returned to the screen. If the chips are crushed before screening, the sawdust will be increased 100 per cent, and 50 per cent of the good chips will be decreased in size. The average mills have not enough chipscreen capacity for their production and I strongly believe that two screens should be installed where generally one is used. A three deck screen where a fraction containing all sawdust and chips below ¼" are taken out is preferable as it is much easier to separate the sawdust from this small fraction of the chips than from the total. Personally, I prefer a shakerscreen for taking out slivers and a rotary for sawdust, and a combination of the two gives excellent results.

Every sulphite mill should have a set of Tyler grading screens for testing the chips and I know of no way for the chemist to earn his wages easier than by making daily chip tests. The various fractions should be plotted and a glance at the curve will tell the story. The desirable fraction should not run less than 85 per cent and it would surprise many mills if they knew that their chips only test 40 per cent and less of desirable chips. The sawdust fraction which really contains a large part of the fine dirt should not go over 2 per cent, and the removal of all sawdust will not only give a cleaner pulp but a stronger one as well with a resultant saving of sulphur.

The proper cleaning of the wood is, of course, essential for obtaining clean sulphite and must be guarded according to the grade wanted.

Sulphur Consumption

A low sulphur consumption is an indication of proper operation of the mill. The theoretical sulphur consumption is in the neighborhood of 9 per cent for spruce and somewhat higher for hemlock and balsam. Why, then, should it be necessary for so many mills to use from 15 to 18 per cent? The whole trouble is in the reclaim-

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ing of the acid and the yield from the wood. Many mills are wasting part of the gas and liquor from their digesters instead of having them absorbed in raw acid. But I know of mills that have good reclaiming, but use too much sulphur on account of low grade chips full of sawdust and slivers, both of which consume sulphur without giving any sulphite. Side relief on the digester which insures proper release of all dry gas is important as proved by the many mills using it. Proper cooling of the relief and absorption in tight tanks or recovery tower is absolutely essential and often badly neglected.

The small extra price of ample cooling capacity and tight tanks are indeed worth while if a saving of $1 per ton of sulphite can be obtained by the saving of sulphur. It is very possible to recover all liquor relief from the digesters except where very high grade bleached pulp is wanted, in which case many mills find it necessary to waste the last part of the liquor. For strong pulp or news pulp no liquor should be wasted.

The acid plant proper can run very efficiently and still the sulphur consumption be high for reasons explained above. The real object of the acid plant is to manufacture a certain number of gallons of raw acid of the right composition as cheaply as possible from a certain number of pounds of metallic sulphur and limestone or lime. The combination of the reclaiming system which ties the digesters to the acid plant and makes them a unit for the manufacture of proper cooking acid is another problem which is of vital importance and neglected very often.

Treating the Pulp

Many mills are wasting quantities of pulp between the digesters and the trucks. Improper draining in the pits causes foam on the screens with resultant loss of fiber. Imperfect blowpit bottoms causes the pulp to go directly into the sewer if saveall is not used. The knotter may be overcrowded so good pulp goes into the screening pile or the screens crowded so the tailings are "rich." The wet-machine cylinders are often leaky, causing the pulp to go into the whitewater, which in many cases is allowed to escape without being run through a saveall.

It is not my intention to knock the chemist in the sulphite mill. Far from it. The chemist is the right hand of the superintendent and is of great assistance if his efforts are led in the right direction. Don't let him bury himself in acid tests and check tests on the digesters, but let him go into the mill and watch the operations and if he has any ingenuity at all he can readily find something on which it is possible to improve.

Taken all in all, the manufacture of sulphite is a very simple task if handled intelligently. It is no chemical mystery, but a straightforward manufacturing proposition.

Don't neglect the sulphite mill and don't look upon it as a necessary evil that is good enough to blame for all troubles on the paper machines. Give the man ahead of it credit for his work and at the same time demand from him that he shall turn out just as good sulphite as your neighbor does, but give him the stuff with which to do it.

INTRODUCTION OF SULPHATE PULP IN THE U. S. A.

Written Especially for the Anniversary Number by E. Meurer, Pres., Central Paper Co.

As in groundwood and sulphite, we trace the invention of sulphate pulp to Germany. C. F. Dahl, an engineer of Danzig, took out patents in 1884, covering a new process to treat wood with sulphate of soda, obtaining thereby the strong fiber now known as Kraft pulp. But mainly on account of the obnoxious odors resulting from this process, the manufacturing of Kraft pulp was not pursued. Later on Swedish pulp-mill engineers took the matter up and found that by cooking in closed vessels, the disagreeable feature connected with the odor could be very largely overcome. Prominent among these Swedish engineers was Carl P. Carlson, who thereupon built several mills in his country, among them the Oerebro and Langbrun.

During one of my visits abroad my attention was called to this new product, with the assurance that this Kraft pulp would unquestionably be the basis for wrapping paper in the future, on account of its much greater strength as compared with sulphite. I therefore visited Carlson at Langbrun, in Sweden, in 1908, as well as others, and perfected arrangements for the construction of a sulphate plant at Muskegon, Mich. As a result of my investigations I was satisfied that the question of the odor, as a nuisance, could be overcome, and our subsequent experiences bore out this contention. We ordered our Digesters and Diffusers from the well-known firm of Julius Pintsch & Co., of Berlin, began construction work in 1908, and produced the first Kraft pulp in the United States in the summer of 1909. This was, however, the second mill on our continent, the Brompton Pulp and Paper Company of Canada having preceded us by a short time. From them as well as from the Swedish mills we had previously imported pulp, had converted it into paper, and were quickly convinced by the reception which it received by our customers that there would be a wide-spread demand for this new product.

Since the year 1909 the manufacture of Kraft pulp in the United States jumped by leaps and bounds, so that we now find as against one mill making 20 tons a day in 1909, 25 mills manufacturing 1,200 tons daily. For the United States and Canada combined, the total aggregates over 2,000 tons produced by 36 plants.

The process itself is now so well known that it hardly needs a description. It is based essentially on the old soda process, but instead of replenishing what is reclaimed in that process, with soda, there is added what is known as salt cake or sodium sulphate.

In a measure this process has helped to conserve the greatly diminishing supply of spruce, as it has made it possible to utilize other coniferous woods as well, which theretofore could not be used to advantage, namely, Jack Pine and Tamarack; and furthermore by the fact that a paper made of this pulp required only about one-half of a given weight in order to meet the particular requirements of the trade.

I am looking for a continuing increased demand for Kraft paper on the part of consumers of wrapping and bag papers. It is apt to displace to a very large degree papers made for a similar purpose out of sulphite, and only protected from complete elimination by the fact that up to the present at least the bright colors obtainable with sulphite as a basis, cannot be duplicated in Kraft pulp.

LA SALLE PAPER CO. IMPROVEMENTS

Following the death of the late Frank P. Nicely, the La Salle Paper Company, South Bend, Ind., has incorporated with the following officers: President, Claude E. Nicely; vice-president, John G. Yeagley; secretary-treasurer, E. O. Nicely; superintendent, C. W. McAlpine. During 1921 the machine room and beater room were enlarged and a concrete foundation put under the paper machine. The cost of these improvements was approximately $50,000.

The plant now has a capacity of 30,000 every 24 hours, while the list of products has been increased to include sulphite screenings, mill wrappers and heavy weight No. 2 kraft.

President Nicely announces that the company contemplates the enlargement of the paper machine by the addition of forty dryers and two more moulds. This work will be started in the coming fall.

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History of the Manufacture of Soda Pulp

First Manufactured on a Commercial Scale in the United States About 1875—American Wood Paper Co., Manayunk, Pa., and D. H. and J. C. Newton Among the First Manufacturers—Development of Electrolytic Bleach Has Played Important Part in the History of the Industry—Recovery of Valuable Products From Destructive Distillation of Complex Organic Matter in Black Liquor Looked Forward to.

Written Especially for the Anniversary Number by Martin L. Griffin, North Dighton, Mass.

I want to say at the outset that I am not an historian in any sense and in the running account which I shall give of the development of soda pulp in the United States, I do not hold myself accountable for accuracy in details or exact dates, nor to a complete account.

The early use of alkaline substances, soaps and the like, for softening and cleansing fibrous materials for paper making is shrouded in mystery, and probably is as old as the art itself. When, therefore, the demand for paper began to exceed the supply of rags which up to that time was the exclusive raw material for paper, it was natural to follow along the same lines in the reduction of wood, using stronger cooking liquors and high steam pressures.

It is recorded that a Frenchman by the name of Meliner was the first to discover the process of reducing wood to pulp in 1865 by treatment with alkalies under pressure. Nevertheless, I believe this honor should be shared by some of our own countrymen and I am indebted to Eugene W. Fry, President of the Jessup & Moore Paper Company for the following historical account of the early experimenters and manufacturers of soda pulp in Pennsylvania.

Early Days of the Industry in Pennsylvania

"Hugh Burgess experimented at Spring City, Pa., in the early '60s until about 1865. The same year, the American Wood Paper Company was started at Manayunk—two of the men who were active in it were Mr. Embree and Mr. Egolf.

"The buildings were completed in 1865 and the mill was leased by Martin Nixon who had a paper mill nearby at Flat Rock, and Jessup & Moore. This lease began six months after operation was started.

"John Saunders, who formerly was head millwright in the Nixon mill, was the first superintendent of the American Wood Paper Company under the Nixon and Jessup & Moore lease.

"In 1872 Nixon left the American Wood Paper Company and started cooking wood, at his Flat Rock Mill, in digesters which he had formerly used for cooking straw. Jessup & Moore continued operating until Bloomfield H. Moore died in 1876 and at that time the lease automatically terminated.

"The Jessup & Moore Paper Company was incorporated in the spring of 1877 and this company decided to build the Delaware Pulp Mills to supply its paper mills with wood pulp. This Delaware Mill was started in 1879, was completed in November, 1880, and operation was started in February, 1881.

"The American Wood Paper Company continued to operate its mill under its own management, but this was not a financial success and after about three years operation stopped."

Early History Elsewhere

The S. D. Warren Company of Cumberland Mills was actively engaged in experimenting with the manufacture of soda pulp about 1875. The late George W. Hammond was at that time connected with the Warren Mills and actively interested in the new industry at that plant. As near as I know, there was a small mill in Yarmouthville engaged in a similar enterprise about the same time which Mr. Hammond very early obtained control of and operated during his lifetime. This was the Forest Paper Company.

My earliest recollections of the process conducted on a commercial scale was as a school boy in Holyoke, which must have been between the years 1875 and 1880, when I saw the fires of the reclaiming process glowing across the third level canal in what was the plant of D. H. & J. C. Newton, which was situated where now the rear portion of the Beebe and Holbrook division of the American Writing Paper Company is located. These two brothers were among the first to make soda pulp, and in passing, I can heartily pay tribute to the four Newton brothers who early came to Holyoke from Greenfield, and as I believe, contributed more as pioneers to the building of the city and establishing the paper industry there than all others combined. They were all architects and builders of mills and manufacturers of paper growing out of the use of soda pulp. The mill was a simple affair but produced at that time a high grade of bleached pulp which was delivered moist as it came from the wet press, in stockboxes to its customers throughout the city. We might date the beginning of the book paper industry in Holyoke from this time and the building of several mills there to make this grade of paper.

My first real contact with this industry came when I opened a chemical laboratory in Holyoke in 1883, when Daniel Newton sent for me to call on him one day. I did so, when he said to me, "Mr. Griffin, we are having so many differences with our customers over moisture in our pulp. I want you to come to my mill every morning and evening and sample it. Take fifteen or twenty pounds, —no homeopathic sample for me." Here he digressed on the absurdity of the chemist's small samples. I mention this incident as moisture contained in deliveries of pulp was beginning to assume important proportions and has played a prominent part ever since. So important, I might add, that it caused a change in the management two years later of what was the Hudson River Water Power and Paper Company of Mechanicville, N. Y., with which I became connected as chemist in 1885.

At this time, a list of the principal mills making soda pulp would include:

The American Wood Paper Company, Manayunk, Penna.; The Jessup & Moore Paper Company, Wilmington, Del.; The Champlain Fiber Company, Willsboro, N. Y.; a small mill in Jackson, Mich., whose name I have forgotten; The Ticonderoga Pulp and Paper Company, Ticonderoga, N. Y.; The Hudson River Water Power & Paper Company, Mechanicville, N. Y.; The S. D. Warren Company, Cumberland Mills, Me.; The Forest Paper Company, Yarmouthville, Me.; The Penobscot Chemical Fiber Company, Great Works, Me.; D. H. & J. C. Newton, Holyoke, Mass.; The Chemical Paper Company, Holyoke, Mass.; H. M. Furbish, The Forest Fiber Company, Berlin, N. H.

In Canada, William Angus of East Angus, and the Canada Paper Company of Windsor Mills were early manufacturers of soda pulp. Of these original mills, the American Wood Paper

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PARSONS MERCANTILE BOND.—Made in White, Blue and Buff.
PARSONS GOTHIC BOND.—A Beautiful Bond Paper at a Medium Price.
PARSONS LINEN.—A High Grade Linen with a Distinctive Finish.
PARCHMENT BRISTOL—The Strongest Bristol Made.

Company, the Newton, the Chemical, Furbish and Angus Mills went out of existence many years ago for different reasons.

The Process

For the most part, the process, at least for the earlier years, made use of the poplar or aspen type of wood for pulp. This wood has always been cut in four foot lengths and sold by the cord with bark on originally. It was the early custom to have a gang of men in the wood yard with draw shaves pealing the wood, and many were the complaints of the pealing by the superintendent if he got any shivy pulp. This was all done away with when it became the custom to cut the wood and strip the bark in the woods during the sap season of growth.

The wood has always been cut up into chips by a disc chipper—screened and delivered to chip bins or digester by conveyors or air blast.

The Liquor Making Process

The liquor making process has been subject to many improvements. At Mechanicville, N. Y., in 1885, the black ash and lime were dissolved and boiled up together and then discharged on to a filter of coal ashes. The next improvement was to leach out the alkali in a system of open tanks with false bottoms using weak liquors upon the stronger tanks. A later process consists in leaching in a series of closed diffusers progressively. There are advantages and disadvantages by either method with the balance in favor of the latter. To the leached liquor, lime is added and after boiling and settling, the liquor is drawn off and the sludge turned to waste. More recently the process of separation by continuous filtration has been adopted in one or two instances, and the lime sludge recovered for reuse.

The Cooking Process

During the early years of the industry, many changes took place. The rotary digester came first. The Jessup and Moore mill was equipped with stationary digesters, direct fired. The process consisted in burning a definite quantity of coal under the digester for each cook. The Newton digesters were upright, stationary and were heated indirectly by coils of steam piping suspended around the inside wall. The Mechanicville mill had a special type of steam boilers having a large steam dome containing a heating coil, through which the cooking liquor was circulated in its passage through the digester.

There were grave doubts in the minds of some, and some prejudice against the use of live steam, but the Willsboro and Ticonderoga plants always have used direct steam through an injector to furnish the necessary heat and circulation, and while it is an almost universal practice to circulate the liquor downwards through the mass, it cannot be denied that upward circulation possesses distinct advantages. There has been little variation in the quality of the cooking liquor. The time of cooking has been shortened by about one-half with consequent increase in yield.

There has been no conspicuous improvement in the manner of discharging the pulp or in washing it, which consists in draining it in open tanks having false perforated bottoms and successively washing it with weak liquor and water.

The Recovery System

It is due to remarkable improvements in the recovery of the alkali that the industry has survived for any length of time. Without recovery of this, it could have had no existence. At first, the black liquor was evaporated in some system of open pans. At Ticonderoga, they took the form of a vertical stack of relatively small dimensions, direct fired below with the hot gas passing over and under them and with the liquor entering and flowing counter current.

At Mechanicville, the system comprised two long pans, brick set and lined with fire brick in the finishing pan, about fifty feet long, one above the other. This was worked much like a puddling furnace in the iron industry and the black ash was hauled out of side doors flaming and red hot. This process comprised both evaporation of the water and incineration of the organic matter. At this time, it cost approximately fifty cents per hundred pounds to recover the alkali.

It was about 1888 that two noticeable improvements were made in this process. The first was the introduction of the multiple effect vacuum pan and second, its counterpart, the rotary furnace.

Vacuum pans were in use in the sugar industry but otherwise were little known or used. Perhaps H. T. Yaryan of Toledo, Ohio, gave the first impulse to the great service the vacuum pan was destined to render in many lines of chemical industry in the improved type of film evaporator which has borne his name so long; but its application to the pulp industry was wholly due to the far sighted ability and judgment of the late Colonel A. G. Paine who quickly grasped its possibilities, and joined with a few friendly manufacturers in the purchase of the exclusive rights to use the new invention for the reclaiming of soda ash. This proved very profitable by the sale of rights to outsiders.

Equally conspicuous has been the invention and adaptation of the rotary furnace in this connection. The history of the S. D. Warren Company has always been an endeavor to improve the processes of paper making, and the company has always enjoyed an enviable reputation for the quality of its products.

The Warren furnace consists of a steel cylinder about 10 feet in diameter and 16 to 20 feet long lined with brick to give it a slight slope from back to front end, surrounded with the necessary rails to turn upon the supporting trucks, and a furnace facing the discharge end. The furnace is set in connection with a steam boiler to utilize the waste heat for the generation of steam which in turn supplies the evaporator. The whole process is nearly automatic, requiring very little attention.

The weak liquor enters the evaporator and discharges at 35 degrees Baumé and passes to the rotary furnace where the remaining moisture is quickly evaporated, and the organic matter burned out, while the black ash automatically falls into conveyors carrying it to the leaching system.

By these two great improvements in black ash recovery, its cost was reduced to some five cents per hundred pounds without giving any credit to the steam produced.

At the time, it required some nerve to discard the old equipment for the new, and called for an investment some of the mills could not well afford. For a time, the plant with which I was connected for so many years in Mechanicville under the management of the late Thomas Duncan, had many trying experiences to contend with. Until the rotary furnaces were installed, the liquors contained a considerable amount of silicates and aluminates of soda, due principally to the solvent action of the alkali on the brick lining in the old furnaces. These impurities formed a hard scale on the tubes of the evaporator in a short time and rendered them useless. This condition forced the abandonment of the old furnace process and the exclusion of every source of these impurities.

Up to this time, all digesters were built of riveted boiler plate and the scale which had been such a trying ordeal in the evaporators had served to keep the joints and rivets tight in the digesters. As soon as the liquors ceased to carry these impurities, they began to leak and grow rapidly worse. What would have been the fate of the industry at this juncture if the welded digester had not made its appearance is problematical. Fortunately, the Continental Iron Works of Brooklyn came to the rescue and made an end to this trouble.

The Bleaching Process

During the earlier years, the bleaching process was conducted in batches using the paper-engine, wooden and brick chests and the like. Then followed an arrangement of tall tanks in series through which the pulp flowed by gravity or with the aid of a

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pump. Of late years, the Bellmer process, capable of circulating very thick pulp, has been adopted by some of the mills, but no conspicuous discovery of importance has been made in the bleaching of the pulp.

Improved Processes for the Production of the Chemicals Used

These include soda ash, caustic soda, lime and bleach. For upwards of a century, the Leblanc process of making soda ash held sway in England and on the Continent until the latter part of the nineteenth century. In 1861, Ernest Solvay established the first plant in Brussels for the process which bears his name. In 1881, Roland Hazard and William B. Cogswell established the first Solvay plant in the United States at Syracuse. This date proved epoch making in the history of soda pulp. The new process was destined to compete successfully with the old and eventually furnish all the soda ash used in this country.

For some time, the manufacturers of soda pulp were skeptical as to its value for their uses. I remember very well addressing a letter to the principal manufacturers of pulp asking them for their opinions and experience with the Solvay ash. Few, if any, accepted it on equal terms with the English ash. One in particular replied in substance, "We tried Solvay ash for three months and lost money and you know, Mr. Griffin, we work so carefully that mistakes are impossible."

At Mechanicville, we used both kinds without discrimination as to quality and became one of the first dependable customers of the Solvay Company and on this account, the two companies always enjoyed very friendly relations.

In the burning of limestone, many improvements have been made in the kilns tending to greater efficiency.

The continuous rotary kiln fired by gas or powdered coal has been developed successfully.

Electrolytic Bleach and Caustic

The development of electrolytic bleach has played an important part in the history of soda pulp. The first attempt to produce a bleaching solution electrolytically was made by the S. D. Warren Company under the the supervision of A. D. Little using the Hermite process. This was about the year 1888 or 1889, but did not prove as successful as expected. This was followed some years later by the Carmichael cell which was successfully operated for several years until improvements by other experimenters made it more profitable to discard it for the Allen-Moore type. This change was made in 1916. This record proves again the persistent force of this company to achieve results.

During this period, there were many experimenters in this field, some of the most important who have developed successful processes are Castner, Townsend, Hargraves-Bird, Nelson and Allen-Moore. A. B. Larchar's name should be included because he, as chemist for the Penobscot Chemical Fiber Company, invented and constructed a successful cell which has proved satisfactory to his company for many years.

E. A. LeSeur should be noticed in this connection with an installation of his cells in the plant of the Burgess Sulphite Fiber Company at Berlin, N. H., about the year 1900.

As is well known, caustic soda is one of the two main products resulting from the electrolytic decomposition of salt. As this company could make no use of the caustic soda, it offered the alkaline liquor in tank cars to the soda pulp mills. I name this date and incident to show the probable earliest adaptation of the electrolytic process for bleach and caustic to the manufacture of soda pulp. At the present time, all the large manufacturers of pulp have their own plants which have reduced costs very materially and made them independent of outside sources of these supplies.

By-Products

Notwithstanding the enormous quantities of complex organic matters in the black liquor, no useful products except the alkali have been recovered. It is well known that these liquors contain potential possibilities of yielding many valuable products on destructive distillation but so far no one has discovered a practical process. I believe, however, that this will be the next important accomplishment in this industry.

So far as the lime sludge is concerned, some minor uses have been found for it and it has been recovered for reuse but to a limited extent.

Chemistry

Perhaps the application of chemistry to the pulp and paper industry has shown as great progress as anything. In 1883, A. D. Little and the writer began their careers as chemists to the industry and were practically alone in the field at that time.

Gradually the most progressive manufacturers showed a disposition to try out the chemist and with what results may be seen by the employment of chemists generally in the larger plants; by the great service Mr. Little has rendered and the most extraordinary profesional laboratory and business he has created and built up; and, what is most significant, the organization of the Technical Association of the Pulp and Paper Industry to which we may look for the progressive leaders in the industry in the future.

The Future

Soda pulp is adapted to the manufacture of book paper and is generally used with sulphite pulp in about the proportion of two to one. It has therefore followed the growth and development of book paper and with few exceptions, their manufacture has gone hand in hand in the same plant or company. New mills have been built slowly, the last having come into operation within five years at Kingsport, Tenn. Preceding this, came the Champion Fiber Company at Canton, N. C., about 1908, and the Oxford Paper Company about the year 1900. The older mills have improved their plants, but these three mills represent about all the new growth there has been in the last twenty-five years.

While the process has its limitations, it is particularly well adapted to produce a soft stock suitable for the better grades of printing paper and there is no likelihood of its place being taken by any other. Poplar wood is a very rapid grower and will reproduce itself with little attention and is of little utility for lumber.

The soda process is the only one adapted to treatment of a variety of straws and stalks which are coming to have increasing attention as a source of paper. The process should be regarded as a fixed and permanent asset to the paper industry and given a prominent place on the roll of honor.

NORWEGIAN PULP AND PAPER TRADE IN 1921

The situation in the Norwegian pulp and paper industries is set forth in the following report to the Department of Commerce from Commercial Attache Anderson, at Copenhagen:

In the Norwegian paper mills there are in all 90 paper machines, only 35 or 40 being in operation on January 1. For the first nine months of 1921 the paper production is estimated at about 65,000 tons, as against 223,000 tons in the same period of 1920. Stocks at present are not large, and the resumption of work on a greater scale at the mills depends on market conditions. For the chemical pulp mills the prospects seem brighter. Four of these mills were at a standstill at the beginning of the year, but two of them will shortly resume operations. The other 12 Norwegian chemical pulp mills, including the Borregaard mill, which is the largest, have been running since last fall. The production of chemical pulp during 1921 is estimated at about 150,000 tons, as against 224,000 tons in 1920.

During the period from January to November, 1921, Norway exported 53,917 tons of printing paper, 16,688 tons of wrapping paper, and 801 tons of cardboard. The corresponding figures for 1920 were, respectively, 116,503 tons, 59,325 tons, and 9,877 tons. Unemployment in the paper and cellulose industries was heavy.

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Development of Use of Electricity in Paper Mills

Serious Attention First Began to Be Given to the Possibilities of Electrically Driven Machinery in the Pulp and Paper Industry About the Beginning of This Century—Paper Machine Presented Greatest Problems for Electrification and Was Last Major Machine Used in the Industry to Lend Itself to Electric Drive—Will Be But Few Years When the Use of Electricity Will Be General in the Industry.

Written Especially for the Anniversary Number by W. W. Cronkhite, of the General Electric Co.

The paper and pulp industry still offers a tremendous field for the use of electrical energy, notwithstanding the advances made in the past few years.

A short twenty years ago, the use of electricity in most paper mills was confined chiefly to lights, and possibly a few motors driving machines that were remote from the steam plant.

First Seriously Considered About 1900

I believe it was during the years 1900-1904 that the men of the paper and pulp industry began seriously to think of the possibilities of electrically driven machinery. It was also about this time that the electrical manufacturers realized the tremendous field offered them for the use of their product and began to develop special electrical machines to meet the requirements found in the average paper mills.

The total amount of power used in paper and pulp mills is exceeded by few other industries in the United States and while at the present time a small portion of this total energy is electrical, the use of electricity is increasing so rapidly that it is only a question of a few more years when the use of electricity will be general.

There have been many electrical developments in recent years, and many of them were brought out especially for the paper and pulp mill. At first direct current motors were used extensively. The alternating current, however, soon supplanted the more expensive direct current machine for most applications, the paper machine itself being the most important exception.

Give Reliability, Economy and Efficiency

It is not the purpose of this article to argue the benefits of electric drive in paper and pulp mills, for that argument has been established not only in this industry but in every other large industry in the country. All engineers will subscribe to the statement that electric drive when properly applied gives reliability, economy and the highest efficiency. Remember, however, that it is most necessary when choosing a motor for your mill that you discriminate somewhat and not go on the assumption that "a motor is a motor," for there are many different types of motor, each with its own characteristics, and if you would secure the highest efficiency and continuity of service, you must choose the motor with the right characteristics for the particular application in mind.

There isn't the slightest doubt that in the majority of mills today many motors are operating, improperly applied, and this means inefficiency, loss of production and higher operating cost. If you give the same amount of care in buying your electrical equipment as you do the other machinery in your mill, your production costs will be materially reduced and your production increased.

Cost of Maintenance

There is one other point that should be brought home to the mill owner, and that is the cost of maintenance. Electric motors or generators, when properly applied and installed will stand considerable abuse and demand nothing more than ordinary attention, probably less attention than any other major machine used in the manufacture of pulp or paper. The proof of this statement can be demonstrated by going into hundreds of mills and noting the methods used for the care of electrical machinery. No doubt this condition is improving every year, for the mill owners are realizing that it is only good business policy to look after and protect the large investment they have in electrical apparatus.

No doubt one of the many things that has helped in making the use of motors more popular, is the great advancement in insulation. It is now perfectly safe to install 2200 V. motors in places where, a few years ago, on account of moisture in the surrounding air, 440 or 550 V. were deemed absolutely necessary. Poorly insulated motors or cheap insulating material has caused more motor failures than any other thing and even now the large electrical manufacturers are spending thousands of dollars on research work to find better materials and better methods of insulating electrical apparatus.

Paper Machine Presented Greatest Problem

The paper machine presented the greatest problem for electrification and was the last major machine used in the industry to lend itself to electric drive. This has now been accomplished and hundreds of paper machines are being driven by electric motors. The latest type of drive, called the Sectional Drive, is now on the market in various forms by the electrical manufacturers, and no doubt this new type of drive is an improvement over either the engine drive or the single unit electric drive, as it does away with the clutches, minor gears, shafting, and the heavy friction load; reduces the power bill and by giving somewhat closer "regulation" probably increases production of the machine.

It is of course always desirable, from the efficiency viewpoint, to direct connect the prime mover to the producing machine whenever it is possible to do so. This is true in all industries. Remember that shafts, belts, clutches, etc., produce no paper. They are only a means of transmitting the necessary power to your producing machine. For years, however, there was evidently no other way to get the power to the paper machine except through these power consuming devices. Now, with the Sectional Drive on the market, and a proven success, you can eliminate them and use the cardinal principle of applying power direct to your paper machine.

Latest Type of Sectional Drive

The latest type Sectional Drive put on the market is an improvement, no doubt, over some of the others, as it has no chains, cones or belts of any size or description, and perhaps for this reason, if no other, may be considered by some to be an improvement over the first types sold.

An installation of this new type is being made in the mill of the P. H. Glatfelter Company, at Spring Grove, Pa., on a new 158-inch book machine. Briefly, the equipment is as follows:

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Direct current motor, direct coupled to each section of the paper machine. Geared to this main driving motor is a small synchronous tie-in motor with a rotating frame. The frame of this rotating element is driven by a very small direct current motor which takes its power from the same source of supply as the main direct current motor driving each section. This means the elimination of the cone pulleys, all belts, and a material reduction in the size of the equipment as to floor space.

The elimination of the cone pulleys, belts and belt shifter made it necessary to obtain the adjustment of draw in some other way. This has been accomplished in this new type of drive by rotating the stator frame of the synchronous tie-in motor, and to do this, a small direct current motor referred to above is used.

The armature of the small D. C. motor is connected directly to the generator bus, while the fields are excited from the exciter, which permits the maintaining of relative speeds of the various sections when the speed of the paper machine is changed as a whole.

The control for this particular paper machine drive is located on the front side of the machine, convenient for the operator.

The Finishing Room

The finishing room of the industry has come in for its share of attention in the past few years, and new methods of applying power to supercalenders and platers have been developed which do away with all unnecessary shafting and gears. The reversing plater can now be equipped with a direct connected reversing A. C. motor and considerable power saved.

The Grinder Room

In the grinder room it is now possible to install a regulating device that will keep down your peak loads on the grinders. This means if you are buying power on a peak basis, using motor driven grinders, you will save considerably on your power bills and only pay for what power you actually use. The device also maintains a constant load on your shaft and in this way fills up the "valleys" in your power curve. This means increased production from your stone, for when the power goes down you certainly produce less pulp. It also means a better fiber, for, of course, one of the requisites for a better fiber is constant speed and constant horsepower.

Use of Steam Flow Meters

The use of steam flow meters has increased very greatly in the past few years, but there is still a great deal to be desired in most boiler plants and paper mills to-day. The steam flow meter is destined to be used more and more each year as the mill operators become familiar with the possibilities. The economical use of coal should be compulsory in all industries and boiler houses equipped with proper steam flow meters give a means of measuring the results of coal burning, by measuring the steam which the coal generates. The costs of manufacturing steam should not be overlooked. The benefits of having an easy method of measuring the output of each boiler and just where the steam is used, should be self-evident to the owner of the mill and to the cost man.

Steam Turbine Being More Generally Used

The steam turbine is coming into more general use each year. Only a few years ago most paper mill men had the idea that the turbine was only applicable to large control stations, but to-day hundreds are being operated in paper and pulp mills and of course all other industries where power and steam is used. There are several types of turbines and it seems absolutely necessary that careful study be made of all local conditions and requirements to determine which type is best suited.

The type sometimes called the "bleeder" type, or steam extraction type, is proving popular in paper and pulp mills and is very successful under proper conditions. This type permits a certain amount of steam to be extracted from the turbine for process work and at the same time takes a certain amount of energy from the steam before it is extracted. Turbines are generally very reliable and rugged, for they have very few moving parts in contact.

The Newest Development

The newest development in connection with the use of electricity in the paper mill is the generation of steam by using surplus power or "high water" power. Most mills developing their own power have a certain amount of water going to waste four or five months of the year. In a mill generating its own electricity, there usually is or should be a spare unit. In a 10,000 Kw. station, this spare unit might be 2,500 Kw. or larger. Four or possibly five months in the year, water is plentiful and this spare unit could be operated, if there were any outlet for the power, at very little cost.

An electric boiler could be installed and this power, whatever it happens to be, be used for generating steam, and consequently a rather large and definite saving in coal will follow. It can be demonstrated that such an installation will pay for itself in less than a year's time.

Just as definite a saving can be made if the mill owner is buying the power at a flat yearly rate. An electric boiler can be used to give the Sunday and holiday steam requirements and to bring up the load factor during weekdays.

There is a splendid chance for saving by using this development. The amount of saving that can be made may be calculated from the following data: Under ordinary conditions, for every 31 Kw. hours used in an electric boiler, one gallon of fuel oil will be saved and for every 5,830 Kw. hours a ton of coal will be saved. Mill operators will find the electrical manufacturers glad to furnish them with complete details to fit their particular case.

Growing Need for Technical Men

In closing, it seems inevitable that the technical man will fast become a requisite to a successful paper and pulp mill, and no doubt the successful manufacturer will be the man who can and will take advantage of the technical man's knowledge. The ideal combination seems to be the technical man working in close co-operation with the experienced paper or pulp man.

PINE TREE PULP CO. READY TO START

The Pine Tree Pulp Company, South Gardiner, Me., of which J. H. Machette is president, is about to start operations. The mill will have a capacity of twenty-four tons of fine ground pulpwood per twenty-four hours. This is to be made out of practically 100 per cent spruce and the wood is to be hand barked. The plant is equipped with Union Iron Works grinders, hooked up with a 1,200 h.p. motor, Union Iron Works wet machines, and Improved Paper Machinery screens. The mill is laid out in the most economical fashion with the idea of using the minimum labor per ton. The mill was planned by Mr. Machette in conjunction with George F. Drew, formerly chief engineer of the Pejepscot Paper Company. Mr. Drew did all of the engineering work and made plans for the building. The construction work was done by the Sanders Engineering Company.

The wood supply comes from the lower Kennebec and the adjacent coast, from which it is brought up to the mill on scows. These wood operations the company carried on itself. It is also having an operation carried on for it on the Dead River. This wood will come down in the spring drive.

In conjunction with the mill, the company has the Fiber Toy Manufacturing Company, which eventually will use a considerable quantity of pulp in the manufacture of dolls and toys. These are made by a special patented process, exclusive rights to which are held by the toy company. At the start the toy company will have a capacity of 6,000 articles in eight hours. The plant is laid out so that double this quantity can be manufactured with the addition of very little extra machinery.

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Paper Board in America

Industry Had Its Beginning in the First Half of the Nineteenth Century With the Invention of the Cylinder Paper Making Machine—Is Distinctly an American Enterprise and Has No Counterpart in Any Other Country in the World—First Great Progress Probably Made by George A. Shryock, Operating a Mill Near Chambersburg, Pa., from 1828 to 1831—Marvellous Expansion in Later Years.

Written Especially for the Anniversary Number by Charles W. Bell

The paper board business as developed in America, has no counterpart in any other country in the world. It is distinctly an American enterprise and had its beginning in the first half of the nineteenth century with the invention of the cylinder papermaking machine. Prior to 1817 paper of all kinds was made in America by hand, and the small quantity of paper board required for book binding, paste board boxes, bonnet bracing, etc., was made by pasting together hand made sheets of paper. The term "paste board" was derived from this process and has been used up to the present by those unfamiliar with the trade, when referring to all grades of paper board. The development of the paper board business in America has been co-incidental with that of the cylinder papermaking machine, and especially with the multiple cylinder machine first built in the seventies of the last century.

The first practical paper machine was used in the Gilpin mill in Wilmington, Del., in 1817, to make writing, book and news paper.

The First Cylinder Machine

A cylinder machine was invented by Dickinson in England in 1809, and the Fourdrinier machine had been invented by Robert in France in 1799; but neither of these machines for papermaking were known in America prior to 1825, as evidenced by the granting of basic patents to Gilpin for his practical cylinder machine in 1817. There is no record indicating that the Dickinson cylinder machine was ever used successfully in Europe, but great progress was made in developing the Fourdrinier machine; and, to the present day the European paper and paperboard makers have used the Fourdrinier type of machines, and they have been preferred and adopted in America for most grades of paper, excepting paper board.

The first Fourdrinier machine was imported in 1827 and set up in Saugerties, N. Y., and the first paper machine of the Fourdrinier type was manufactured in America by Smith & Winchester of South Windham, Conn., in 1829, and set up in the Hubbard Mill in Norwich, Conn.

The available records indicate that the single cylinder paper machine was in practical use in America for all grades of machine made paper, at least ten years before the Fourdrinier type was introduced here.

These first cylinder machines were all wet machines, the paper being loft dried or sun dried and finished after leaving the machine.

Presses, dryers and calenders were soon added and used for finishing the product of light weight paper, on the machine.

There was also developed a cylinder wet machine for producing the heavier weight paper products, or paper boards.

George A. Shryock, a Pioneer

Probably the first great progress was made with this machine by George A. Shryock, operating a mill near Chambersburg, Pa., from 1828 to 1831. He invented the grooved wood roll or mandrel on which the thin film of wet paper, as couched from the cylinder mould, was wound and thus the sheet built up to the required thickness, when it was cut from the roll or mandrel along the groove and peeled off to be air-dried and sheet calendered. Shryock was one of the first to use paper pulp made from straw and is credited with being the first to manufacture paper board from straw; although, in the early thirties the manufacture of light weight straw paper was a prominent industry in Columbia county, New York.

In 1831 Shryock enlarged his business, taking on partners, the firm being G. A. Shryock & Co. They built a large mill, reported to be 150 by 50 feet and five stories high, with eight wet machines and a capacity of nine tons per day. It was known as "The Mammoth." It was burned when Chambersburg was destroyed in 1864.

Mr. Shryock is reported to have said: "It is not difficult to tell the origin and progress of the manufacture of straw paper and boards, but who can tell the toil, labor, anxiety and mental agony endured for the first four or five years?"

Slow Expansion Up to Seventies

During the period from 1830 to 1870 the paper board business grew slowly and mills were built west of the Allegheny Mountains and in Ohio, Indiana and Illinois, where straw was plentiful and cheap. The mills were equipped with cylinder wet machines and there were many improvements in the method of cooking or "subduing" the raw straw and preparing it for felting on the papermaking machines. Many improvements in drying, calendering and finishing the sheets were made.

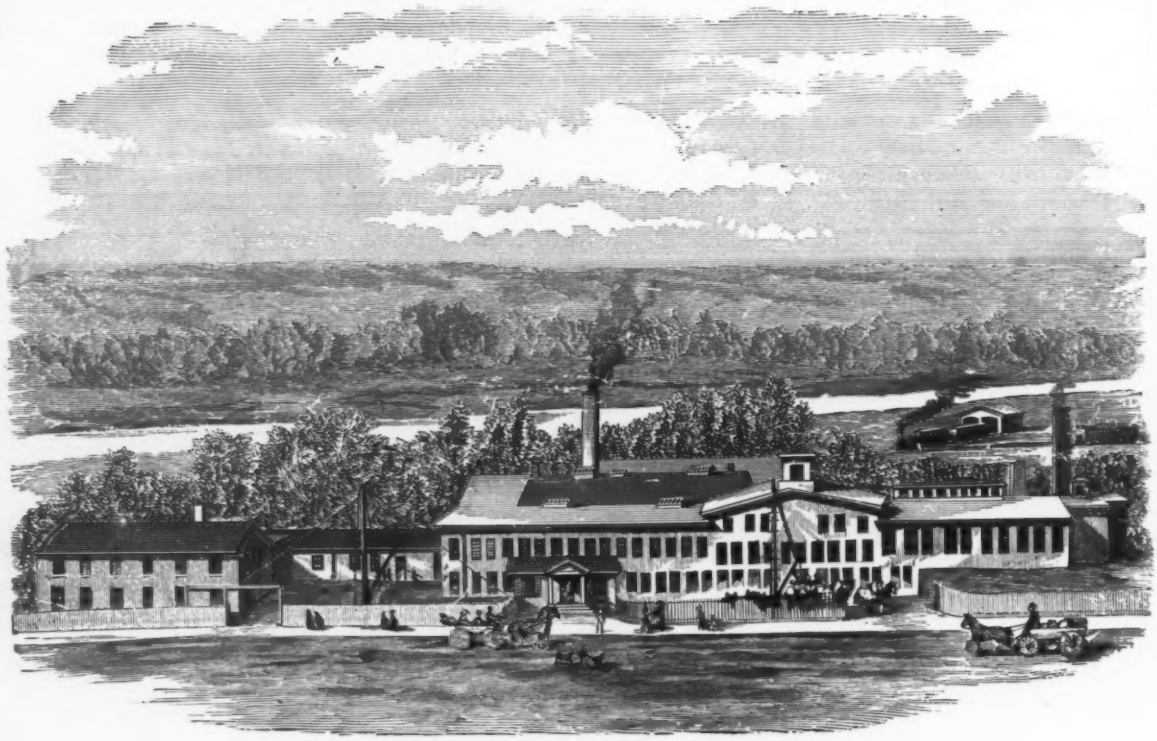
The Multiple Board Machine

With the "boom" in business following the Civil War, there was a decided increase in the demand for paper boxes, and that business soon required an increased supply of paper board. The machines making light weight papers had been equipped with presses, dryers and calenders, so that the paper was finished on the machine. The wet machines used for making paper board were of small capacity (one to two tons per day for each machine), and labor cost was high. It was natural to try to finish the paper board on the paper machine and the result was the development of the multiple cylinder board machine, which is in effect, a wet part consisting of two or more wet machines, or the cylinder moulds and vats and couch rolls of the wet machine, placed in tandem, and the paper film of each cylinder couched on a continuous felt passing over the cylinder moulds and through press rolls, the paper web thus built up and formed passing over dryers and through calenders to sheet cutters or reels to be finished in rolls.

This development of the multiple cylinder paper board machine required years of experimenting by many manufacturers of both paper board and papermaking machinery, and has engaged the talent of many inventors and the expenditure of much money.

As stated before, there has been no similar development of paper board production or of similar papermaking methods in any other country in the world, the few multiple cylinder machines in operation in Europe, Japan and Australia, being exported from America in recent years.

On multiple cylinder machines two endless woolen felts are used,



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between which the wet web is pressed until strong enough to bear its own weight and be passed to the heavier press felts and rolls. In designing the first multiple cylinder paper board machines, the cylinders and vats were so arranged that the paper web was couched from part of the cylinders on the bottom felt and from the other cylinders on the top felt, and when the top and bottom felts were pressed together the complete web of board was formed. This was considered necessary in forming the heavier sheets of board. This method was later changed, so that as many as eight cylinder moulds were placed in tandem and the film from all of them couched onto the bottom felt.

The usual practice prior to the nineties was to use only four cylinders and some heavy strawboards were made on only three cylinder moulds in tandem.

By increasing the number of cylinders a lighter or thinner paper film was made in each cylinder to produce a given thickness of board.

On the early multiple cylinder machines with three or four cylinders, it was believed that only free paper pulp, such as straw, could be used, and until the nineties there were very few grades of paper board made on the multiple cylinder machines except strawboard.

For various reasons it was desirable to make paper boards near the large markets in the Atlantic Coast States, and the waste or chips of strawboard were accumulated, and mills in these Eastern States were built to make "chip board."

It was soon found that other than strawboard waste could be used, especially on machines having 5, 6 and 7 cylinders, and a great variety of boards were produced from all kinds of old papers and of wood pulp, which by that time had come into general use in the manufacture of most all grades of paper.

Combination Board

The greatest advantage of the multiple cylinder paper board machine is the ability to make on it a sheet of paper board composed of as many different kinds of papermaking pulp as there are cylinders on the machine, because each cylinder and vat is a separate paper-forming unit on which can be formed a paper film composed of any paper pulp that is conducted to the vat. These separate wet films, being couched in sequence on the woolen continuous felt and pressed together, are combined in a solid sheet. This can not be done on any other kind of paper board machine.

The ability to make combination paper board has made possible a very great variety of paper board, a great reduction in cost of some grades, and has made available a paper board that is necessary to many kinds and styles of packages that would not be possible if paper board had to be made of just one kind of paper pulp; or, if the sheet had to be built up of various kinds of paper, as in the first quarter of the nineteenth century, or the "paste board" era.

Business Has Made Wonderful Strides

The paper board business has made wonderful strides in the past thirty years. When the American Strawboard Company was organized by the Moore Brothers in 1889, they controlled 90 per cent of the paper board business of the country, or 450 tons daily capacity. U. S. Government statistics for 1920 indicate that the daily average of paper board made and sold in September was over 9,000 tons per day, or at the rate of three million tons a year.

The increased producing capacity is shown to be almost two thousand per cent in thirty-three years.

U. S. Government statistics also show that the paper board business is the largest branch of the paper business of America, being over one-third of the total tonnage produced, value of product and capital invested.

One of the discouraging features of the business from the investor's point of view has been that the supply of paper board has always kept ahead of the demand, with resulting unprofitable prices or a resort to illegal combinations and pools; and these price-fixing schemes have always resulted in new mills and increased competition.

W. H. Moore in 1901 said to a committee of manufacturers who asked him to organize and finance the proposed consolidation that resulted in the United Box Board and Paper Company: "No, thank you. After my experience with the American Strawboard Company I am convinced that it is not a trustable business. It is too easy to get into it."

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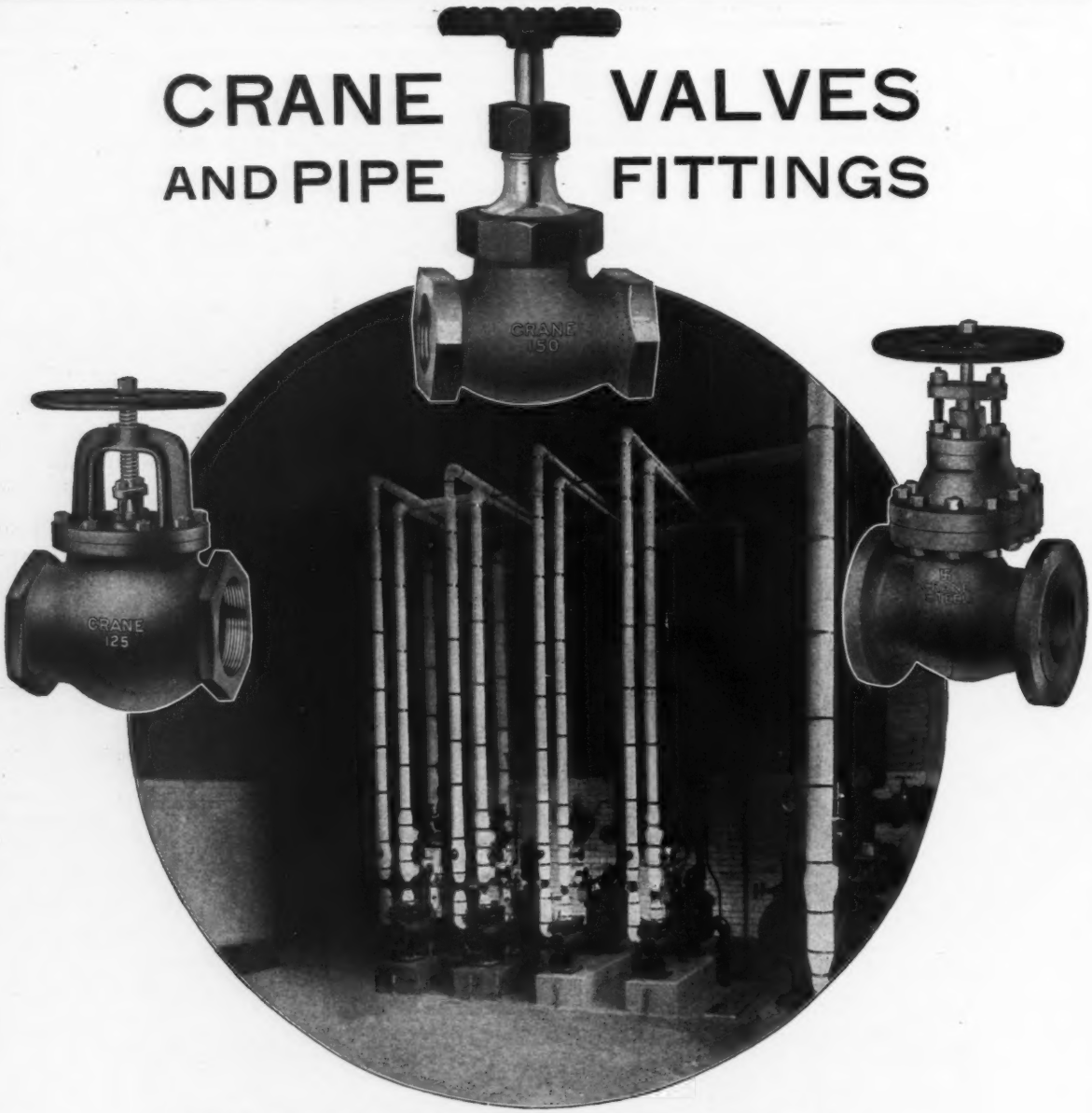

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Introduction of Glassine Paper Making in U. S.

What Is Now an Important and Rapidly Growing Branch of the Paper Making Business Was Begun in 1904 at Hartford City, Ind., by the Hartford City Paper Co. to Save Its Business From Ruin—Many Hardships and Discouragements Encountered in the Early Days of the Venture—All of These, However, Were Successfully Overcome in the course of Time—Foreign Competition Overcome.

Written Especially for the Anniversary Number by B. A. Van Winkle, Treas. and Gen. Mgr., Hartford City Paper Co.

The introduction and development of the manufacture of greaseproof and glassine paper in the United States was the result, as most such things are, of necessity and accident.

Introduced by Hartford City Paper Co.

The Hartford City Paper Company, which Co. introduced the manufacture of greaseproof and glassine paper in the United States, had located its mill in Hartford City, Ind., on account of the abundance of natural gas available for fuel at the time it was located, and equipped it with paper making machinery, and also with proper equipment for producing mechanical wood pulp. The product at that time was butcher's manila, and butcher's fiber. After operating on this output for a number of years, with very indifferent success, the supply of natural gas finally became exhausted. This took away from the company the only natural advantage it possessed and rendered it impossible for it to produce mechanical pulp at a profit, or to continue the manufacture of butcher's manila or butcher's fiber on a profitable basis.

Must Wreck Mill or Find Specialty

The writer of this article became associated with the company as general manager in the fall of 1904, and after having made a careful study of the possibilities for this mill, called a meeting of the directors and told them that in his opinion there was but one of two things that we should do. One was to wreck the mill and sell it for junk, and the other was to find some specialty which a mill in this location would be suited to make. After mature consideration the board of directors decided that we would look for the specialty, and put it up to the writer to find one which we could profitably make. This was a big job. We found the specialty market was already taken up by people who were engaged in manufacturing various specialties. Finally the writer drifted into the mill of the Sorg Paper Company in Middletown, Ohio, and was telling his troubles to the then general manager, Mr. Calvert, who called his attention to an advertisement in one of the trade papers of a young man who understood the manufacture of greaseproof paper, and who desired to form a connection with some mill in the United States which would undertake to produce it. At that time we knew nothing at all about the manufacture of greaseproof paper. We did not know what materials were required nor what it would cost to manufacture it, but we were drowning and were grabbing at every straw in sight, so we immediately got into communication with him and found him to be a young Swede named Olaf Hedstrom, who had been educated in the mills in Germany and who had come over to the United States to further increase his knowledge of paper making, and had discovered that greaseproof and glassine papers were not being produced in the United States. He knew the value of the paper as a food product wrapper and thought it could be profitably manufactured in this country. We found him located in one of the mills in Rumford Falls, Maine, and engaged him to come out to Hartford City to undertake the production of greaseproof and glassine paper. He came on about the middle of December of 1905 and is still the superintendent of the Hartford City Paper Company.

Equipment Crude and Unsuitable

We immediately began experimenting on the production of greaseproof paper but found that our equipment was crude and unsuited to this purpose and that our help was entirely without experience, and we were further handicapped by the fact that our superintendent could hardly speak the English language at all, and that it was very difficult for him to make himself understood. However, as soon as it became known that we were attempting to make this class of paper, we began receiving a great deal of unsolicited advice to the effect that we were wasting the time and money of the company to attempt the manufacture of this paper in the United States. We were told that the climatic conditions in this country were not suited to the manufacture of this paper, and that, furthermore, a suitable pulp could not be had in the United States and that even if we should succeed in producing a marketable product from imported pulp that the Germans would see to it that our pulp cost us so much that we could not continue at a profit. Also we were told that our equipment was not at all suited to the manufacture of this kind of paper. This latter statement we found to be true. After experimenting for several months we decided, however, that it was within the range of possibilities, with proper equipment, to produce a good sheet of greaseproof and glassine paper in the United States from domestic pulp. After arriving at this conclusion we sent Mr. Hedstrom to Germany authorized to buy the necessary equipment for producing this paper. This equipment was not then being produced in the United States. In due course of time the equipment arrived and was installed and we began to turn out a reasonably good greaseproof paper.

Hard Foreign Competition

It then dawned on the manufacturers abroad that competition in this line of paper was about to develop in the United States, and they, in conjunction with the importers, undertook to drive us out of the market with low prices, and the prices at which they had been offering this paper were reduced as much as $90.00 a ton. Under these conditions we were again confronted with the fact that we could not earn a profit, but we also discovered that this paper was in the unclassified list in the tariff law and bore only a 25 per cent ad valorem rate. We appealed to Congress for a reclassification and asked to be placed in the classification with parchment papers. This was in 1907, but we could not get any relief from Congress until the general revision of the tariff bill was had in 1909. By this time our losses had grown to such a tremendous sum that we found ourselves in the position of the unfortunate poker player, our losses so great that we dared not quit the game. The Ways and Means Committee of Congress began holding hearings on the revision of the tariff law in the fall of 1908. We appeared before them with our briefs, setting

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out our reasons for asking to be taken from the unclassified list and to be put in the classified list with parchment papers, our contention being that the labor cost of producing this paper was equal to the labor cost of producing parchment paper. Our contention was resisted by the importers with all the force they could command, but at the end of a ten months' struggle we succeeded in convincing Congress that we were right and were given the same rate as parchment papers. This placed us in position to compete with the imported paper and have some profit left. We then realized that we did not have sufficient capacity to take care of the business that we believed would come to us, so we immediately set about to rebuild our mill and add additional special equipment, and by the fall of 1910 we had more than doubled the capacity of our mill and greatly improved its products, so that we had the largest mill in the world which confined itself exclusively to the production of greaseproof and glassine papers.

Campaign for Extension of Uses

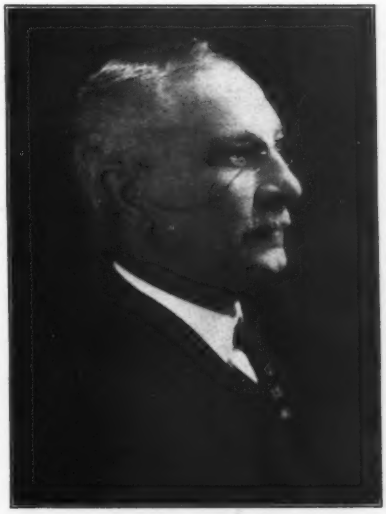
Having established the business on a firm footing, and having convinced ourselves that there were many new uses to which this paper could be put, we opened branch offices in Chicago and New York and began a campaign for the extension of its uses. From that time on we found ourselves upon the right side of the ledger and our business constantly increasing. We became more and more favorably known to the trade and finally were able to convince the large users of this paper that our product was equal, if not superior, to any made in the world, so at the end of sixteen years of strenuous effort we have the satisfaction of knowing that we established the manufacture of a useful paper in the United States, that there is now a larger number of people employed in its production, and we believe that the number so employed will grow from year to year, and that the industry is a permanent one. Looking at our accomplishment from the standpoint of a financial benefit to the stockholders we sometimes wonder whether or not the results are "worth the candle." We do, however, console ourselves with the thought that results cannot always be measured by the "dollar yard stick," and that the benefits which have come to the people of the United States, and which will continue to come to them, by reason of the manufacture of this paper in this country will largely compensate us for our early hardships and discouragements.

REMINISCENCES OF THE EARLY DAYS OF THE JOURNAL

HARD RIVER, Ore., April 10, 1922.

Editor PAPER TRADE JOURNAL:

At your request I send what I know of the early history of THE PAPER TRADE JOURNAL. In the early seventies I was a young paper maker having just served seven long years' apprenticeship in England. I landed in Holyoke and worked for the Whiting Paper Company for a number of years. In 1874 THE PAPER TRADE JOURNAL offered a prize of Hoffman's *Treatise of Papermaking* to one getting the most subscribers. Inasmuch as I had helped Mr. Hoffman, when he was writing the book, especially on sizing, I was anxious to obtain the volume. I won the prize, and have it yet. THE PAPER TRADE JOURNAL was then a long slim journal and sold for $2.00. I sold it long after this. THE PAPER TRADE JOURNAL was the official journal of the Paper Makers' Protective Union, one of the first, if not the first, in this country. I was elected secretary and managed the business. It was a no strike union, and had the good will of most manufacturers. I had an ambition to make this so strong and good that all paper makers would join, and so strong financially that when we met the manufacturers around the table we met as equals, and with a give and take policy all disputes were settled. I also had a dream of an old age pension for paper-makers, paying so much per month, and I had no doubt the manufacturers could be persuaded to put some of their profits in this fund. I was young at this time and how little I knew of the selfishness of men! In 1876 I left Holyoke to take charge of a finishing room in Philadelphia, soon after with $1,800 in the treasury. They voted to divide it. THE PAPER TRADE JOURNAL published pages of letters in regard to it, and a number of editorials. How much better off today would paper-makers have been if they had remained united under the above system than the present. I have seen them strike, when a little common sense would have settled matters, men lose their jobs and homes, and manufacturers suffer a large loss.



W. E. GOODENOUGH

In 1875 all fine papers were made in loft dried mills. A slump in business caused them all to shut down for five weeks. At once the book mills, which were short of business also, started making engine sized papers, which made business in loft dried mills bad for some time. At this time most of the machine tenders were old country paper makers, mostly Scotch-Irish and English. A great many of them drank very hard, so also did the salesmen.

I remember an incident, which would seem strange today. One of the machines in a mill making high grade paper was giving lots of trouble. They could not seem to locate the trouble, so they sent for a machine tender that was off tour and an expert. They found him in a saloon so drunk he could not walk. They took him to the mill in a cab. He crawled around and told them what to do, and started the machine. Those days 40 to 50 feet was fast speed. The machines today run 200 to 250 feet. Book machines that used to run 100 to 150 now run 500 to 600 feet.

Many of the paper makers of those days became superintendents and manufacturers, among them Noah Bryant. I remember going with him to see them start the first fast machine making news print, at the Turners Falls Paper Company. It was to run 300 feet. They had considerable trouble getting it over at that speed. The late George Marshall took us to the machine room, and the two Marshall boys were running the machine. John Anderson, John Jack, Robt. Allen, John Forsythe, Wm. Reardon, John King, John Phillips, George Perkins, are among the machine tenders I remember that became prominent in the paper business.

Those days I remember Hon. Wm. Whiting as one of the finest paper manufacturers and a fine man. He was mayor of the City of Holyoke and was always respected by his help.

In all these years I have read THE PAPER TRADE JOURNAL. And its present form and the information contained in it shows to my mind the great strides the paper business has made. I congratulate you on your fiftieth birthday and can assure you I feel as young as the days I sold your paper.

W. H. GOODENOUGH.

The General Screen Corporation, Utica, has been incorporated in New York by A. R. Paul, Utica, to manufacture paper screens.

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Cigarette	Nitrating	India Bible
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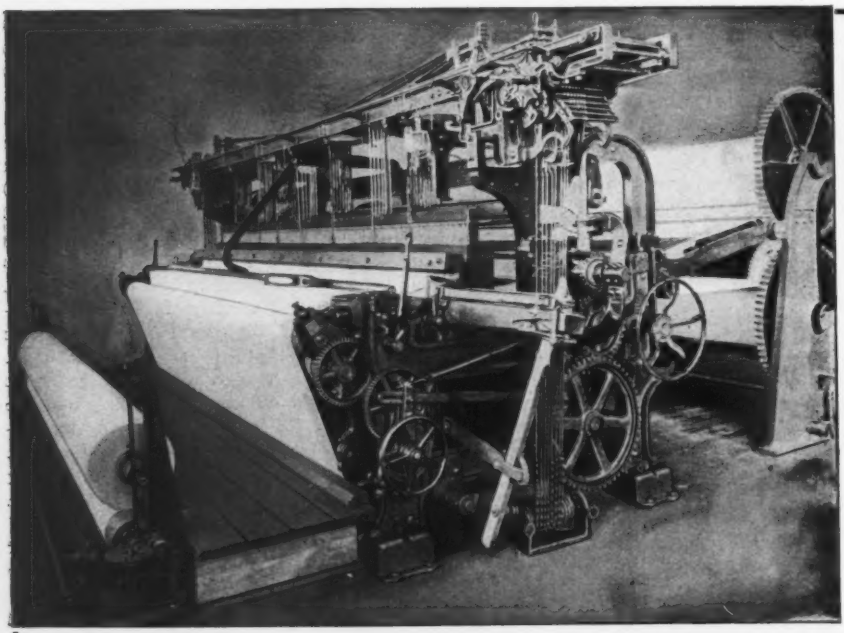

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English Weave in Two, Three, Four, Five and Six Ply—60 Inches to 176 Inches in Width.

Fine Faced Felts for Fine Papers. Absolutely no felt marks in paper. Triune Three Ply Felts for Coarse Papers.

Development of the Paper Export Business

This Business in America Has Not Expanded More Rapidly Because Manufacturers Have Concentrated on Domestic Demand and Paid Attention Usually to Export Business Only When Home Demand Has Slackened—In Europe on the Contrary This Business Has Long Been Developed in a Systematic Manner—Some Points to Be Considered in Connection With Foreign Trade—Future of the Business.

Written Especially for the Anniversary Number by John Matthews

It is safe to say that very few American paper mills have been planned or organized with the export trade in view. The paper manufacturers' point of view has been centered on domestic demand, and export trade, instead of being a consideration, has nearly always been looked upon as unattractive or, at most, in the light of a possibility when domestic demand slackened.

It is perhaps because of this fact that the development of foreign trade in American papers has not grown faster than it has done. Paper manufacturers were not alone in this attitude of mind towards export business. In general they were so much occupied with domestic business that few of them foresaw the large possibilities in foreign trade, although in some lines those who did have the vision have reaped a reward. But such reward has come only to those who have had a settled policy to place part of their output in the foreign markets, and have persisted in their efforts to develop foreign trade, sometimes under disadvantages, but in the main with fair success; and such success has come for products in the manufacture of which it was for a long time thought that Europe surpassed us. It never could have come if the attitude of the American manufacturers toward export business had been to favor it only when they were short of domestic business, and to disregard it when domestic business was brisk.

Why Larger Figures Were Not Reached

Comparing this attitude with the course adopted by European manufacturers in developing their export trade, it can be readily understood why the development of export business in American paper had not reached larger figures prior to the war. With few exceptions, it was only with difficulty that paper mills could be brought to look upon export trade as having large possibilities, and, while those few exceptions have proved the wisdom of being receptive to foreign business for at least a portion of their tonnage, they stood out in high contrast with the trade in general, which, until quite recently, looked upon export business as purely incidental, and upon each order not as related to a settled policy, but from the viewpoint as to whether it was, or was not, convenient. In short, there was no settled policy tending to the encouragement of export trade, so that when domestic conditions became dull, mills could at least look for a reasonable demand from the foreign markets. Consequently, without sustained interest on the part of mills, the development of this trade was left to the comparatively few export firms, who worked under considerable difficulties to arouse interest on the part of the foreign buyer, and endeavored to create interest on the part of the mill.

When the foregoing condition is contrasted with the long-laid plans and continuous energies in foreign markets, which have been characteristic of the development of the export business in paper from Europe, it is not difficult to understand that, while the figures of exports over the past few years have shown something of the possibilities of the trade, the success of foreign exporters has not been entirely related to prices, but is very closely related to organization, methods, and persistency.

The World Demand for Paper

The remarkable increase in exports of American paper, beginning with 1916, and even up to and including 1920, has perhaps had its most important effect in bringing home to us, to some extent, the world demand for paper. It is to be remembered that the figures represent only a portion of what the foreign trade could have consumed—the quantities exported from the United States having been limited by two stern controls—submarines and extreme shortage of vessels—as well as unusually heavy demand at home. If these had not controlled the export trade, the foreign demand for paper would have come to this country in such figures as would have enlightened our manufacturers to the large possibilities in foreign trade; and would, it is to be hoped, have whetted their appetites to such an extent that it would be a comparatively easy matter to interest them, to the largest degree, in plans for future development toward marketing a portion of their product abroad. That some paper manufacturers have enlarged their views in this respect has been clearly evidenced, but they find it difficult to understand why, when they are ready to give a willing ear to foreign business, which, for a few years had been so easily forthcoming from foreign markets, it is not to be had. This cannot be looked upon as surprising when we consider the upset condition of the world, and especially so, when in our own country not only has demand slackened off, but buyers, almost without exception, are unwilling to place orders beyond their immediate requirements. Human nature is very much the same all over the world; and customers abroad being not only overloaded with stocks, but in many instances embarrassed through abnormal supplies reaching them within a limited period of time, it was only to be expected that foreign trade would slacken, and that foreign buyers would have the same attitude of mind towards ordering as our buyers have had at home. Foreign stocks are being liquidated, and, in some instances, have been worked off, with the result that in some of the markets there are clear evidences of reviving interest. But for a time our foreign competitors, because of depreciated exchange, have been able to reap a benefit and to sell at such prices as, speaking in the larger sense, made it impossible for American papers to compete. This condition is rapidly changing, and with increased labor costs abroad, with prices approximating more and more to our level, we are again within a measurable distance of putting American papers in the foreign markets in competition with European products; but the condition into which we are coming will probably be different from the past, because, not only has American paper gone into nearly all the world markets in larger quantities than ever before, but consumers are now acquainted with it in a broader way.

Furthermore, they have a better knowledge of the qualities and characteristics of American papers, so that with intelligent co-operation on the part of the mills, the export trade, it is to be expected, will before long have a far better chance for development than ever before.

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Government Aid

These same conditions exist in other trades, and it is not surprising that our Government, recognizing the need of export business, is endeavoring in every conceivable way to foster its development. The Bureau of Commerce, through its commodities divisions, evidences this in the clearest way, and from every direction the attention of manufacturers is being directed more and more towards the importance of encouraging export business. The American Pulp and Paper Association, as is now well known, has succeeded in its efforts to have a paper division in the Bureau of Commerce; and this, through its agencies abroad, is calculated to have a good effect in enlightening the trade as to export wants. But no amount of statistical information will enable American paper to take its proper place abroad without a clearly defined policy on the part of paper manufacturers, and above all, without a clear understanding of certain fundamental methods that are so generally recognized in the development of business in the domestic market, as to make it surprising that manufacturers do not see the necessity for similar methods in developing foreign trade.

The Personal Equation

Undoubtedly, every reader of the PAPER TRADE JOURNAL knows the importance of personal contact. Our foreign competitors certainly do, because in every market where paper is sold, there has at some time entered into the transaction the personality of the seller as representing the producer. It is almost unthinkable that our foreign competitors, even supposing their mills had been specially equipped for export business, would rest content in attempting to get business through correspondence. They know the great importance of personal contact, and the impossibility even of retaining their business abroad, not to speak of developing it, unless in some way their product is personally represented. It is comparatively easy to get business when demand exceeds supply, but just as soon as the case is reversed, there is danger of losing even an established trade, unless the mill product is represented, not by correspondence alone, but by the personal contact, which, establishing human relations with the buyer, keeps in touch not only with his requirements, but with competitive efforts to get the business. If this is left out of calculation, it is only a question of time when competitors will get a trade which has been fondly thought to be strongly entrenched. It is just as reasonable to expect continuous business from abroad by confining one's efforts to correspondence, as it would be to expect continuous business in the domestic market, without ever coming into personal contact with the customer. As we all know, human nature is the same all over the world, and whether the buyer speaks our language or a foreign tongue, it would be unwise to overlook the fact that the man on the spot, establishing constant contact with the buyer, is in a far better position to win out, than the seller, who, thousands of miles away, and without any personal relation with the buyer, imagines he can, not only retain, but develop his foreign trade. This being conceded, and assuming that a mill seriously desires to extend its interest in foreign business, the question arises as to what is really the best way to place its products before the trade abroad, and not only show what it can produce, but bring into the transaction those factors best calculated to produce results in the way of business.

There are some large industries, like steel, electrical machinery, etc., whose foreign interests are so large as to permit of maintaining their own selling organizations in the most important trade centers of the world; but these are interests of large capital, which, through their past efforts, have obtained a position in foreign trade enabling them to carry the expense of such organizations abroad. There are perhaps few, if any, paper organizations that would today consider such an expense as would be involved in maintaining a selling organization throughout the world. Some mills have sent representatives abroad at considerable expense, in the hope that the efforts of such representatives would at least bring some reward in the way of starting business; but, as already pointed out, whatever might be the initial success of such efforts, they can hardly be continuous against the active and continuous competition of the resident competitor.

Expert Knowledge Required

We can pass by the question of attempting successfully to do a business by correspondence, and accepting as a fact the need of personal representation, it becomes a very pertinent question as to just how that personal representation can best be obtained. Before dealing with this, however, it is best to have in full view the fact that in treating with a customer abroad, there are matters to be considered, difficulties to be encountered and overcome, and methods involved so far different from the conditions to which we are accustomed in developing domestic business that they call for especial attention and expert knowledge.

A very important part of foreign business has necessarily to be transacted with people speaking a different language, with different modes of thought to our own, making it necessary for the salesman either to know the customer's language and his way of thinking, or at least to be able, in some way, not only to communicate his ideas, but to know beforehand fairly well how such ideas will be received by the customer. This knowledge cannot easily be attained; it is like many other things—the product of time and experience. The salesman must be acquainted with the local market requirements and with all the details, which, in many cases, are different from those usual in the domestic trade. He must know when, and when not, to act; when and when not to press for business. Such a salesman, and especially so in the Latin-American countries, knows that methods, tried and successful at home, would fail with the foreign buyer. He must put his full personality, first of all, in cultivating a personal relation with the customer, and only then, having acquired, on the most friendly footing, the confidence of the customer, he can proceed to use his persuasive powers. This takes time and real ability; but without it, the chances of developing trade by the more direct methods, to which we are accustomed at home, is but small. To the largest degree, these same requirements are called for in successful salesmanship in all other foreign markets; especially those where habits and customs are just the opposite of our American ways. To expect a permanent and successful business, without understanding or realizing the difficulty or impossibility of changing customs firmly established a long time before it was ever thought that paper could be exported from the United States, is not the way to develop business. Not only is it necessary to speak with the customer in his own language, but all the subsequent details must be carried out in a way to which the buyer is accustomed. If he speaks and thinks in terms of centimeters and kilos, the transaction must be carried throughout in such terms. In short, the salesman translates even sizes and weights into a foreign tongue, and must do everything in his power, not only to meet the customer's wishes but to make the transaction as simple and as understandable as it is humanly possible to do. When one consider that in a large number of cases all of this has to be conveyed through a language foreign to his own, one gets some idea of the difficulties involved in a transaction, which eventually reaches the mill here in terms easily understood. It is hardly necessary to dwell much on the difficulties surrounding foreign shipments, such as consular invoices to be drawn up in a foreign language, exchange, export shipping documents, and a variety of forms unavoidable, but necessarily connected with foreign business. It can be recognized that these alone involve a degree of attention for which our mills are not adapted, nor indeed is it to be expected that they would have the facilities to attend to such. If, therefore, it is impracticable for a mill organization to maintain its own selling force in various centers abroad, and if, as will doubtless be easily conceded, it is next to impossible to develop a foreign trade through correspondence alone, the matter as to how

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SMITH, WINCHESTER & CO.
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CONTINUOUS SERVICE
1922

BUILDERS OF THE

FIRST FOURDRINIER MACHINE

BUILT IN THE UNITED STATES

PAPER MILL MACHINERY

1828
PIONEERS
PAPER
MACHINERY
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THE SMITH & WINCHESTER MFG. CO.

SOUTH WINDHAM, CONN.

1893—INCORPORATED—1905

FIFTY YEARS AGO

Completed for
Smith Paper Co.
LEE, MASS.
November 25, 1871
One Jordan & Eustice Patent Refining Engine
Price $845.00

Completed for
Thomas Phillips Co.
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One 62" Cylinder Machine
Price $5,600.00

In April, 1899, We Purchased the Business of
THE FRANK A. JONES CO.—Their Complete Line of
Paper Bag Machinery—The Cranston & Jones
UNDERCUT CUTTERS

In April, 1908—We purchased of THE NATIONAL MFG. CO.
Their Complete Line of "NATIONAL BAG MAKING MACHINERY"

TODAY

We Solicit Your Inquiries

ON OUR RECORD OF SERVICE TO THE PAPER MAKING INDUSTRY

DESIGNERS AND BUILDERS OF MACHINERY

SUCCESSFUL IN OPERATION

EFFICIENT IN PRODUCTION

Birdseye View of Our Modern Plant Which Includes the Building of THE ORIGINAL OFFICE AND SHOP
The Present Office Building Was Completed Fifty Years Ago

such trade can be developed centers itself in the question as to how the necessary facilities can be best obtained.

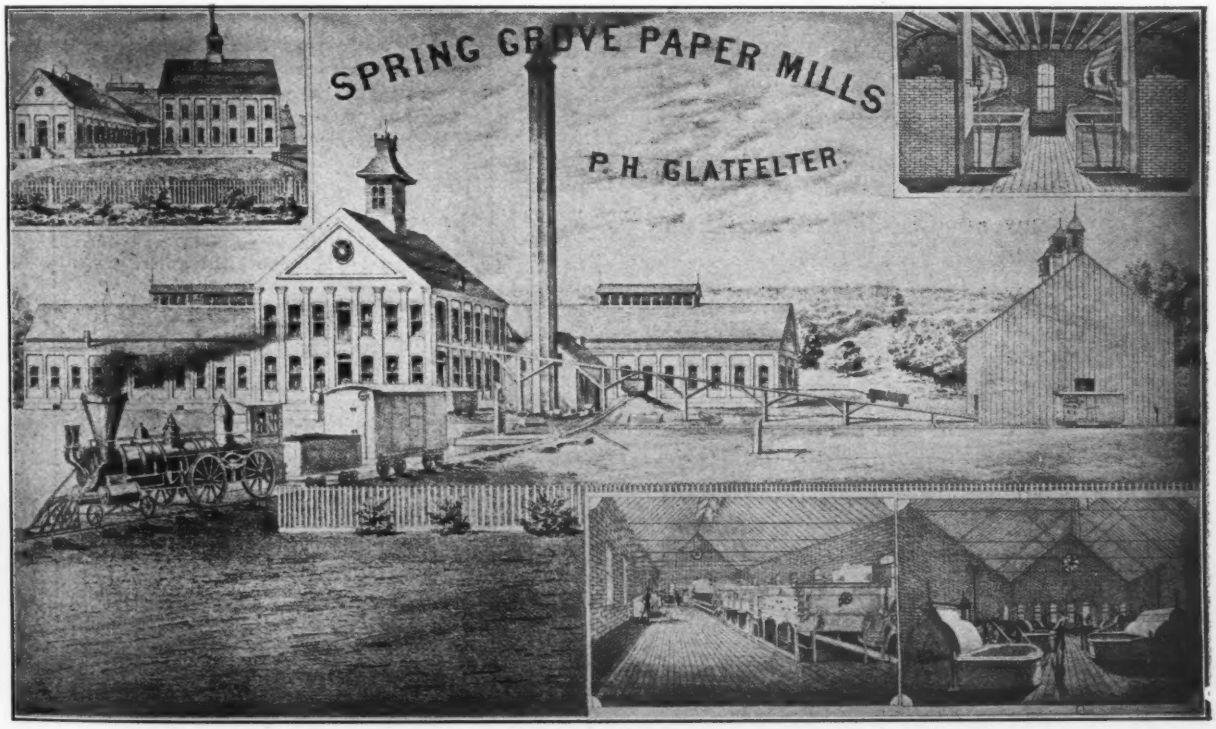
How Export Organizations Have Been Developed

Right here, due credit should be given to the organizations that have for many years given their energies to the development of export business. This has been done at large cost in building up and maintaining selling organizations, sometimes under great disadvantages; and, as we have before pointed out, frequently without that measure of co-operation on the part of mills which would have made the task easier. Pioneers in new fields, they have carried into strange markets, to people of various nationalities and tongues, a knowledge of American paper; have patiently, and against the strongest competition, pointed out the superior characteristics of our American papers; have preached the doctrine that, as paper, our products have more real paper value than the poorer European qualities; have demonstrated the strength, wearing ability, and other characteristics of American products, and in the face of continued difficulties have forced a recognition of American paper as being entitled to its place in the "sun." Blazing the way, they have made it possible for American paper mills to secure export business for their product, and manufactures connected therewith; which, according to Government statistics, amounted in 1914 to the value of over $20,000,000, and in 1921 to almost $50,000,000, which latter figure, if calculated at only fifty per cent on account of increased prices, represents a reasonable increase beyond the figure given for 1914. We can pass by the inflated figures of the war period, as not representing a normal growth of trade, although it might be said in passing that exports of the same articles in 1920 reached the figure of almost $90,000,000. When we consider the growth of this foreign trade over the past twenty years, it is but fair to recognize that this is closely related to the efforts in foreign markets of these "Pioneers of the Paper Trade."

That there is a place for American paper abroad has been proven. It should hardly need any argument to prove the wisdom of an earnest endeavor on the part of paper manufacturers to cultivate foreign trade, and to strengthen the hands of those who are engaged in its development. There is today perhaps a more intelligent interest in such development than there has ever been before. There is also today a greater need for a settled policy on the part of mills towards a more favorable view of export business than has been the case in the past, and a determination to co-operate with every endeavor to further the export of American paper. It should be quite evident that every pound of paper exported, whoever produces it, has its influence on domestic conditions; that it affects every mill producing that kind of paper, and that in the aggregate such exports tend to stabilize domestic conditions.

In building up export business, it is not the wisest course to view it from the standpoint of immediate profit. A more reasonable view is to look at it in the light of building for the future. It costs money to establish business, but once established, and with constant demand, profits are sure to come.

The war, much as we all deplore it, brought with it not only a large export demand for our products, but also an opportunity for the future. Shall we allow this to pass, or shall we with determination build for the future, with a firm resolve to obtain our full share of the foreign trade. If the latter, there must first of all be a settled policy on the part of mills to encourage such trade, and a willingness to put at least part of their tonnage in the foreign markets, even when, as we all hope, the domestic demand is in a flourishing condition. An enlightened, aggressive, and encouraging attitude towards such trade is certain to bring results. For, if our exports under normal conditions, against European competition, and without any particular effort on the part of mills, can reach such figures as are shown by the Government statistics, it is not difficult to discern what the trade will be, even if the same conditions continued in the future, which is most unlikely.



A Typical Paper Mill in 1872 When the Paper Trade Journal Was Founded. Plant of the P. H. Glatfelter Company at Spring Grove, Pa.

Finish given by Plain Felt.

Improved finish given by the Kenwood One-Sided Board Felt.

THIS illustration is a photographic comparison between the finish given by the Kenwood Plain Bottom Board Felt, which has up to now given such universal satisfaction, and the IMPROVED FINISH given by the NEW KENWOOD ONE-SIDED BOTTOM BOARD FELT. (The same relative improvement in finish is given by each of the other new Kenwood One-Sided Felts.)

An Unusual Achievement in Board Felt Combinations Which

GIVES BETTER FINISH PRODUCES DRIER BOARD INCREASES PRODUCTION

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To obtain the finest degree of finish with the maximum removal of water equip your machines with

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Albany, N. Y.

How Kenwood Mills eliminate guesswork in the factors of Strength, Stretching, Porosity, Finish of Product and Life or Wear of Felts.

Especially designed and patented machines in the Kenwood Research Laboratories now measure the POROSITY (openness) of each Kenwood Paper Makers' Felt, and its capacity in the removal of water, just as accurately as you measure the strength of paper with a Mullen Tester. Every felt made in Kenwood Mills is now TESTED FOR POROSITY before being shipped.

The RELATIVE FINISH OF PAPER produced from any design of Kenwood Felt is now recorded in Kenwood Laboratories just as accurately as if paper were actually made on it.

The WEAR or LIFE of each Kenwood Felt design is now determined in the Kenwood Laboratories by running on a testing machine which duplicates a paper machine in all essential features.

The STRENGTH or STRETCH of felts at various loads is also recorded on special machines.

The result of this accurate knowledge is that the Kenwood Felt combination will meet your requirements whatever the type of paper you wish to make.

Paper and Pulp Production in U. S. 1919

Total Value of All Varieties of Paper Manufactured Was Valued at $788,059,375 as Compared with $332,147,175 in 1914, $267,656,964 in 1909, and $188,715,169 in 1904—Total Amount of All Varieties of Pulp Produced Equaled 3,517,952 Tons in 1919, 2,893,150 Tons in 1914, 2,495,523 Tons in 1909, and 1,921,768 Tons in 1904—Number Employed and Wages Paid in the Various States.

The following table shows the number of establishments, average number of wage earners, aggregate horsepower, capital, salaries and wages, amount of wages paid, number of salaried employees, cost of material and value of products:

	Number of Establishments	Average Number of Wage Earners	Aggregate Horsepower	Capital	Salaries and Wages	Amount of Wages Paid	Number of Salaried Employees	Cost of Materials	Value of Products
California	7	806	16,275	5,930,989	1,171,991	923,418	124	3,407,580	5,805,199
Connecticut	44	1,999	26,742	13,346,926	2,884,865	2,193,938	348	8,216,619	12,939,103
Delaware	5	683	5,120	3,802,604	928,664	792,665	43	3,229,680	4,573,339
Illinois	19	1,831	22,438	13,928,744	2,653,301	2,130,263	171	9,212,453	14,356,529
Indiana	26	2,214	25,485	13,030,002	2,682,208	2,238,632	164	9,514,166	15,120,059
Iowa	4	136	1,932	2,515,745	185,418	141,161	14	292,653	612,132
Kansas	3	291	2,007	1,451,865	359,034	286,433	52	1,120,785	1,778,761
Maine	39	13,058	299,073	130,702,071	20,224,748	16,507,569	1,305	54,670,588	93,916,628
Maryland	10	1,480	18,148	10,214,631	2,371,541	1,948,658	96	6,816,027	9,916,625
Massachusetts	78	12,960	145,323	88,302,299	18,143,525	14,642,413	1,542	53,763,884	87,159,890
Michigan	39	9,561	95,729	53,680,651	13,066,728	11,177,009	661	40,353,447	66,299,513
Minnesota	9	2,523	56,106	24,634,705	3,618,666	2,993,895	248	11,408,868	20,138,482
New Hampshire	27	5,000	123,929	51,603,019	8,061,090	6,545,865	326	24,833,996	41,825,551
New Jersey	33	3,108	32,948	20,886,508	4,941,519	3,722,101	377	11,995,355	20,360,692
New York	156	17,571	415,306	167,111,332	26,590,218	22,114,221	1,612	76,953,743	129,381,032
Ohio	49	6,899	64,420	74,498,111	10,099,792	8,094,230	663	35,710,348	55,089,196
Pennsylvania	56	9,843	83,510	63,882,518	15,350,500	12,459,234	1,156	37,643,118	64,715,767
Vermont	20	1,832	42,084	15,314,137	2,711,256	2,144,116	162	6,564,300	10,862,858
Virginia	10	1,951	15,367	12,881,963	2,582,741	1,958,230	176	7,795,674	13,602,264
Washington	6	1,610	31,809	12,049,294	2,614,904	2,173,628	152	5,062,430	10,653,361
West Virginia	9	956	12,136	4,435,602	1,207,672	995,250	80	3,299,515	4,887,568
Wisconsin	57	12,789	239,464	92,268,720	16,741,134	14,014,430	1,123	45,200,945	80,328,483
All other[1]	23	4,658	85,738	29,322,147	6,451,871	5,493,283	410	10,416,463	23,727,345
Total	729	113,759	1,861,089	905,794,583	165,643,386	135,690,642	11,005	467,482,638	788,059,377

[1]All other includes: District of Columbia, 1 establishment; Georgia, 5; Louisiana, 3; Mississippi, 1; North Carolina, 3; Oregon, 4; Rhode Island, 1; South Carolina, 1; Tennessee, 2, and Texas, 2.

The following are the figures as compiled by the United States Bureau of Census, of paper and pulp for 1919 as compared with 1914 and 1909:

PAPER AND WOOD PULP

TABLE 22.—PRODUCTS BY STATES, 1919, 1914 AND 1909

Product and State	1919 Value	1919 Quantity (Tons 2,000 Lbs.)	1914 Quantity (Tons 2,000 Lbs.)	1909 Quantity (Tons 2,000 Lbs.)
Newspaper, in rolls and sheets, total	$98,559,359	1,323,880	1,313,284	1,175,554
New York	35,922,875	863,341	489,136	374,808
Maine	28,507,697	424,706	336,020	313,125
Wisconsin	9,736,081	115,987	135,336	169,151
Minnesota	9,580,742	117,386	111,002	43,565
New Hampshire	2,281,032	28,950	79,664	[2]
Vermont	2,017,361	28,052	31,223	16,455
All other States	10,511,871	145,458	130,903	258,450
Hanging papers, total	6,043,390	69,445	96,527	92,158
New York	4,374,840	48,215	69,022	62,179
Wisconsin	1,071,483	15,726	14,870	8,868
All other States	597,067	5,504	12,635	21,111
Poster, novel, tablet, lining, etc., total[1]	7,272,755	80,394	7,883	[2]
Book paper:				
Plain, total	118,270,776	818,820	786,626	575,616
Massachusetts	18,045,565	111,788	106,845	88,744
Pennsylvania	14,921,845	96,731	118,590	73,763
Michigan	13,976,418	97,220	88,840	72,677
New York	13,138,331	96,252	78,917	66,139
Wisconsin	12,463,685	93,207	74,560	57,493
All other States	45,724,932	323,622	318,874	216,800
Coated, total	24,009,614	132,454	117,342	95,213
Michigan	10,810,359	54,733	26,101	[2]
All other State	13,199,255	77,721	91,241	95,213
Plate, lithograph, map, wood cut, etc., total	1 556,372	9,821	9,332	6,498
Cover paper, total	5,643,191	22,163	21,679	17,578
Massachusetts	2,001,029	6,849	6,475	3,898
All other States	3,642,162	15,314	15,204	13,680
Fine paper, total	87,740,806	325,183	247,728	198,213
Ledger and highest grade, total	12,254,967	30,584		
Massachusetts	7,512,822	13,584		
All other States	4,742,145	17,000		
Pole dried, total	19,868,978	48 564		
Massachusetts	16,452,684	39,510		
All other States	3,416,294	9,054		
Air dried, total	9,514,618	28,786		
Wisconsin	6,070,369	19,363		
Massachusetts	2,465,349	6,170		
All other States	978,900	3,253		
Machine dried, total	14,665,308	59,674		
Massachusetts	7,629,046	30,856	[4]	[4]
All other States	7,036,262	28,818		
Sulphite bond, total	17,484,179	82,467		
New Hampshire	3,315,233	17,438		
New York	657,778	2,721		
All other States	13,511,168	62,308		
All other, total	13,952,756	75,108		
Ohio	6,163,332	31,771		
Pennsylvania	4,178,187	22,684		
New Hampshire	1,249,799	6,903		
All other States	2,361,436	13,750		
Wrapping paper:				
Manila (rope, jute, tag, etc.), total	16,441,591	119,368	77,878	73,731
New York	3,485,162	18,181	16,327	17,347
All other	12,956,229	101,187	61,551	56,384
Heavy wrapping (mill wrappers, etc.), total	11,315,201	135,501	98,780	108,561
Pennsylvania	3,157,708	31,167	18,369	36,619
Wisconsin	2,324,571	23,952	11,424	[2]
New York	2,272,796	31,007	19,654	18,951
All other States	3,560,126	49,375	49,333	52,991
Straw, total	457,606	5,895	15,606	13,988
Bogus or wood manila, all grades, total	11,099,121	118,589	353,987	367,932
New York	3,248,479	36,757	87,277	79,952
All other States	7,850,642	81,832	266,710	287,980
Kraft paper, total	26,575,194	192,583	109,753	[5]
Wisconsin	5,249,615	36,897	15,808	[5]

The Best Known Paper Machine Trade Mark in the World

Backed by the highest quality Machines human skill can create.

Puseyjones Machines are built to sustain a reputation which we hold priceless.

Ask Us.

The PUSEY and JONES COMPANY

WILMINGTON, DELAWARE

U. S. A.

	1919 Value	1919 Quantity (Tons 2,000 Lbs.)	1914 Quantity (Tons 2,000 Lbs.)	1909 Quantity (Tons 2,000 Lbs.)
Pennsylvania	3,121,783	23,351	[5]	[5]
New York	3,055,354	23,604	[5]	[5]
Vermont	830,375	6,578	[5]	[5]
All other States	14,318,067	102,153	93,945	[5]
All other wrapping paper, total	37,180,784	259,436	225,795	179,855
Wisconsin	7,655,119	58,934	60,320	41,471
Michigan	4,995,975	36,876	44,677	38,224
New York	2,736,519	20,934	23,605	30,474
Massachusetts	1,424,826	6,820	[5]	[5]
Pennsylvania	1,195,591	8,827	29,299	15,507
All other States	19,172,754	127,045	67,894	54,179
Tag stock (rope, jute and sulphite), total	5,459,980	27,092	29,230	[6]
Boards:				
Wood pulpboard, total	14,887,881	179,747	116,419	71,036
New York	3,449,512	44,927	32,376	23,757
All other States	11,438,369	134,820	84,043	47,279
Strawboard, total	12,229,837	228,248	175,424	171,789
Ohio	3,347,752	48,618	39,496	37,710
Illinois	2,630,255	42,246	42,952	29,510
All other States	6,251,830	137,384	92,976	104,569
Newsboard, total	4,604,082	88,839	127,966	74,606
New Jersey	1,392,596	25,989	42,328	33,411
All other States	3,211,486	62,850	85,638	41,195
Binders', trunk and press boards, total	3,787,860	43,091	61,453	[7]
Connecticut	1,151,642	8,814	12,895	[7]
All other States	2,636,218	34,277	48,558	[7]
Cardboard, bristol board, card middles, tickets, etc., total	11,104,105	84,987	83,010	51,449
Massachusetts	4,830,930	23,910	34,899	26,694
All other States	6,273,175	61,077	48,111	24,755
Leather board, total	2,263,288	28,167	26,689	[7]
New Hampshire	394,950	6,250	3,972	[7]
All other States	1,868,338	21,917	22,717	[7]
Chip board, total	37,749,210	695,963	[7]	[7]
New York	4,208,905	89,999	[7]	[7]
Illinois	3,760,931	75,385	[7]	[7]
New Jersey	2,195,779	41,041	[7]	[7]
Connecticut	1,075,166	22,047	[7]	[7]
All other States	26,508,429	467,491	[7]	[7]
All other boards, total	37,464,370	518,022	700,844	514,208
New York	6,213,069	82,316	135,467	111,487
Connecticut	5,094,998	69,514	62,937	46,957
Illinois	4,153,638	71,391	63,027	51,200
New Jersey	3,931,952	53,236	74,569	37,302
Ohio	3,864,914	47,959	127,814	54,116
Indiana	2,372,332	41,405	55,285	40,556
All other States	11,833,477	152,201	181,745	172,590
Tissue paper	40,695,523	190,561	115,401	77,745
High grade, total	11,137,550	31,025		
New York	1,535,775	6,038		
All other States	9,601,775	24,987		
White, colored and waxing, total	7,644,952	36,545		
Manila and No. 2 white, total	3,589,279	23,985		
New York	2,206,958	14,705	[4]	
All other States	1,382,321	9,280		
Towel and napkin, total	5,144,895	19,266		
Toilet, total	13,178,847	79,740		
New York	8,005,041	47,197		
All other States	5,173,806	32,543		
Blotting paper, total	3,209,137	13,420	14,157	9,577
Building, roofing, asbestos and sheathing paper, total	17,737,341	195,244	243,908	225,824
Pennsylvania	5,202,680	63,716	55,273	60,168
All other States	12,534,661	131,528	188,635	165,656
All other paper, total	29,690,905	191,617	93,346	96,577
Pennsylvania	2,865,451	12,373	551	2,390
All other States	26,825,454	179,244	92,795	94,187
Wood pulp made for sale or for use in establishments other than those in which produced, total	80,095,047	1,101,928	912,490	910,846
Ground, total	11,728,801	345,929	313,951	310,747
Maine	5,131,076	148,746	118,813	107,116
New York	3,666,570	110,774	100,631	100,383
Wisconsin	1,418,865	38,163	43,337	37,964
All other States	1,512,290	48,246	51,170	65,284
Soda fiber, total	14,939,293	169,332	163,522	155,844
Sulphite fiber, total	49,507,190	516,104	407,314	444,255
New York	8,041,032	85,672	53,874	146,256
Maine	7,629,408	81,118	50,432	46,073
Wisconsin	6,014,906	81,645	78,878	73,719
All other States	27,821,844	267,669	224,130	178,207
Sulphate fiber, total	3,136,154	44,292	10,052	[6]
Screenings, mechanical, total	33,448	2,313	2,553	[8]
Screenings, chemical, total	750,161	22,333	15,098	[6]
All other products, value	$34,915,240	.....	.....	.....
Wood pulp produced (including that used in mills which produced), total	.....	3,527,678	2,893,150	2,495,523
Ground, total	.....	1,518,829	1,293,661	1,179,266
New York	.....	479,817	423,605	405,376
Maine	.....	469,148	357,393	324,264
Wisconsin	.....	225,843	189,221	166,822
Vermont	.....	69,946	54,356	48,390
New Hampshire	.....	41,192	63,883	[9]
All other States	.....	232,883	205,203	234,414
Soda fiber, total	.....	411,693	347,928	298,626
Sulphite fiber, total	.....	1,419,829	1,151,327	1,017,631
Maine	.....	323,718	236,385	217,501
New York	.....	260,891	219,446	234,717
Wisconsin	.....	233,591	188,797	154,391
All other States	.....	601,629	506,699	411,022
Sulphate fiber, total	.....	120,378	52,641	[6]
Wisconsin	.....	44,119	24,633	[6]
All other States	.....	76,259	28,008	[6]
Screenings, mechanical, total	.....	12,220	11,769	[6]
Screenings, chemical, total	.....	35,003	35,824	[6]

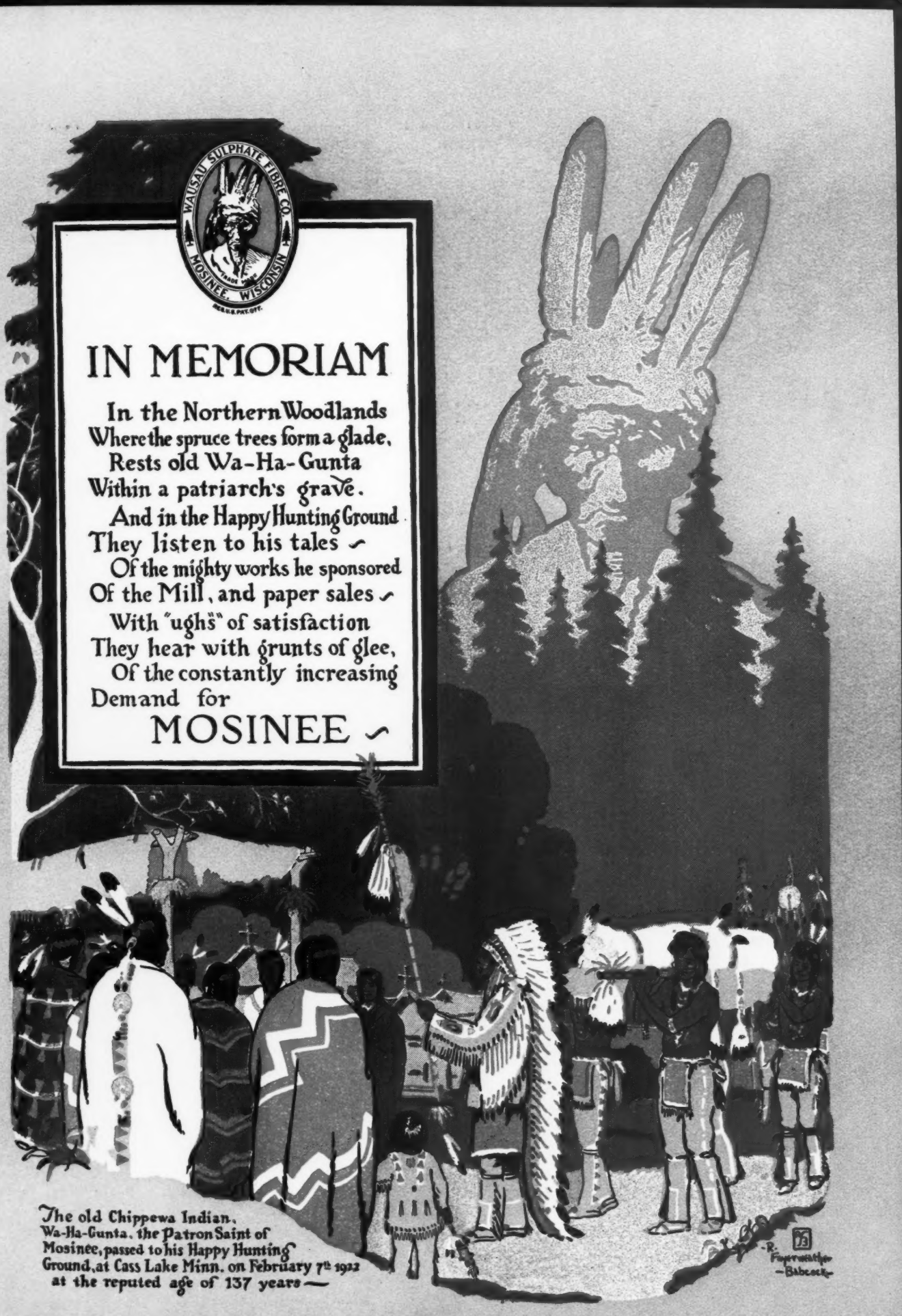
[1]Reported as "poster" in 1914.
[2]Included in "all other States."
[3]Included in "newspaper, in rolls and sheets."
[4]Figures not available.
[5]Included in "all other wrapping paper."
[6]Not reported separately.
[7]Included in "all other boards."

PAPER AND WOOD PULP

TABLE 20.—DETAILED STATISTICS ON QUANTITY AND VALUE, 1919, 1914, 1909 AND 1904

Product[1]	1919	1914	1909	1904
Total value	[2]$788,059,377	[2]$332,147,175	[2]$267,656,964	$188,715,189
Newspaper, in rolls and sheets:				
Tons	1,323,880	1,313,284	1,168,098	912,822
Value	$98,559,359	$52,942,774	$46,390,041	$35,906,460
Hanging papers:				
Tons	69,445	96,527	92,158	62,606
Value	$6,045,390	$4,488,910	$4,431,514	$3,013,464
Poster, novel, tablet, lining, etc.[3]:				
Tons	80,394	7,883	7,456	[4]
Value	$7,272,755	$490,766	$465,519	[4]
Book paper:				
Book, machine finished—				
Tons	532,413			
Value	$76,772,582			
Book, sized and supercalendered—		786,626	575,616	454,500
Tons	286,407	$58,496,221	$42,846,674	$31,156,728
Value	$41,498,194			
Coated—				
Tons	132,454	117,342	95,213	[4]
Value	$24,009,614	$11,605,584	$9,413,961	[4]
Plate, lithograph, map, wood cut, etc.—				
Tons	9,821	9,332	6,498	19,837
Value	$1,556,372	$588,332	$555,352	$1,458,343
Cover paper:				
Tons	22,163	21,679	17,578	22,150
Value	$5,643,191	$2,809,377	$1,982,853	$2,023,986
Fine paper:				
Ledger and highest grade—				
Tons	30,584			
Value	$12,254,967			
Pole dried—				
Tons	48,564			
Value	$19,868,978			
Air dried—				
Tons	28,786			
Value	$9,514,618	247,728	198,213	146,832
Machine dried—		$34,054,918	$29,076,638	$22,249,170
Tons	59,674			
Value	$14,665,308			
Sulphate bond—				
Tons	82,467			
Value	$17,484,179			
All other—				
Tons	75,108			
Value	$13,952,756			
Wrapping paper:				
Manila (rope, jute, etc.)—				
Tons	119,368	77,878	73,731	86,826
Value	$16,441,391	$7,070,254	$6,989,436	$6,136,080
Heavy (mill wrappers, etc.)—				
Tons	135,501	98,780	108,561	96,992
Value	$11,315,201	$3,588,357	$4,380,794	$4,035,588
Straw—				
Tons	5,895	15,606	32,988	54,232
Value	$457,606	$519,309	$870,419	$1,389,348
Bogus or wood manila, all grades—				
Tons	118,589	353,967	367,932	228,371
Value	$11,099,121	$17,975,636	$19,777,707	$10,099,772
Kraft—				
Tons	192,583	109,753	12,661	[4]
Value	$26,575,194	$6,949,244	$936,940	[4]
All other—				
Tons	259,436	225,795	167,194	177,870
Value	$37,180,784	$13,269,953	$9,265,095	$8,774,804
Tag stock (rope, jute and sulphite)—				
Tons	27,092	29,230	[4]	[4]
Value	$5,459,980	$1,935,693	[4]	[4]

THE WATERBURY FELT COMPANY
SKANEATELES FALLS, N. Y.


WAUSAU SULPHATE FIBRE CO.
MOSINEE, WISCONSIN
IN MEMORIAM
In the Northern Woodlands
Where the spruce trees form a glade,
Rests old Wa-Ha-Gunta
Within a patriarch's grave.
And in the Happy Hunting Ground
They listen to his tales
Of the mighty works he sponsored
Of the Mill, and paper sales
With "ughs" of satisfaction
They hear with grunts of glee,
Of the constantly increasing
Demand for
MOSINEE
The old Chippewa Indian,
Wa-Ha-Gunta, the Patron Saint of
Mosinee, passed to his Happy Hunting
Ground, at Cass Lake Minn. on February 7th 1922
at the reputed age of 137 years
R. Fuguet Babcock

THE STEADFAST
Unswerving
Unconquerable
Spirit of
Old
Wa-Ha-Gunta
Still
Abides in

MOSINEE KRAFT

Product[1]	1919	1914	1909	1904
Total value	[2]$788,059,377	[2]$332,147,175	[2]$267,656,964	$188,715,189
Boards:				
Wood pulp—				
Tons	179,747	116,419	71,036	60,863
Value	$14,887,881	$4,227,493	$2,639,496	$2,347,250
Straw—				
Tons	228,248	175,424	171,789	167,278
Value	$12,229,837	$4,270.519	$3,750,851	$4,367,560
News—				
Tons	88,839	127,966	74,606	38,560
Value	$4,604,062	$3,502,134	$2,215,469	$1,174,216
Binders', trunk and press—				
Tons	43,091	61,453		
Value	$3,767,860	$2,663,744	92,012	[4]
Leather—			$3,819,071	[4]
Tons	28,167	26,689		
Value	$2,263.268	$1,177.189		
Cardboard, bristol board, card middles, tickets, etc.—				
Tons	84,987	83,010	51,449	39,060
Value	$11,104,105	$5,376.434	$3,352,151	2,764,444
Chip—				
Tons	695,963	[5]	[5]	[5]
Value	$37,749,210	[5]	[5]	[5]
All other—				
Tons	518,022	700,844	422,196	253,950
Value	$37,464,380	$23,652,096	$13,720,697	$9,070,531
Tissue paper:				
High grades—				
Tons	31,025			
Value	$11,137,550			
White, colored and waxing—				
Tons	36,545			
Value	$7,644,952			
Manila and No. 2 white—				
Tons	23,985	115,401	77,745	43,925
Value	$3,589,279	$11,535,720	$8,553,654	$5,056,438
Towel and napkin—				
Tons	19,266			
Value	$5,144,895			
Toilet—				
Tons	79,740			
Value	$13,178,847			
Blotting paper:				
Tons	13,420	14,137	9,577	8,702
Value	$3,209,137	$1,457,897	$1,186,180	$1,046,790
Building, roofing, asbestos and sheathing paper:				
Tons	195,244	243,908	225,824	145,024
Value	$17,737,341	$9,475,733	$9,251,368	$4,845,628
All other paper:				
Tons	191,617	93,346	96,577	106,296
Value	$29,690,905	$7,464,182	$6,869,169	$6,729,820
Wood pulp made for sale or for consumption in mills other than those in which produced:				
Tons	1,100,303	912,490	910,846	780,706
Value	$80,095,047	$31,677,717	$30,177,366	$23,144,574
Ground—				
Steamed—				
Tons	61,411			
Value	$2,224,664	313,951	310,747	273,400
Not steamed—		$5,666,919	$5,649,466	$4,323,495
Tons	284,518			
Value	$9,504,137			
Soda fiber—				
Tons	169,332	163,522	155,844	130,366
Value	$14,939,293	$7,213,086	$6,572,152	$5,159,615
Sulphite fiber—				
Bleached—				
Tons	288,709	214,627		
Value	$31,715,215	$10,803,787	444,255	376,940
Unbleached—			$17,955,748	$13,661,464
Tons	227,395	192,687		
Value	$17,791,975	$7,284,492		
Sulphate fiber—				
Bleached—				
Tons	4,740			
Value	$392,765	10,052	[4]	[4]
Unbleached—		$359,957	[4]	[4]
Tons	39,552			
Value	$2,745.389			
Screenings—				
Mechanical—				
Tons	2,313	2,553	[4]	[4]
Value	$33,448	$27,910	[4]	[4]
Chemical—				
Tons	22,333	15,098	[4]	[4]
Value	$750,161	$301,566	[4]	[4]
All other products, value	$34,915,240	$8,880,990	$4,738,549	$1,924,195
Wood Pulp				
Quantity produced (including that used in mills in which manufactured), total, tons	3,517,952	2,893,150	2,495,523	1,921,768
Ground—				
Steamed, tons	281,635	1,293,661	1,179,266	968,976
Not steamed, tons	1,237,194			
Soda fiber—				
Bleached, tons	384,085	347,928	298,626	196,770
Unbleached, tons	27,608			
Sulphite fiber—				
Bleached, ton	509,738	385,349	1,017,631	756,022
Unbleached, tons	910,091	765,978		
Sulphate fiber—				
Bleached, tons	26,003	52,641	[4]	[4]
Unbleached, tons	92,375			
Screenings—				
Mechanical, tons	12,220	11,769	[4]	[4]
Chemical, tons	35,003	35,824	[4]	[4]

[1]Quantities reported in tons of 2,000 pounds.
[2]In addition, in 1919 paper to the value of $1,064,772 was produced by five establishments engaged primarily in the manufacture of paper boxes, roofing materials, and other products, in 1914 to the value of $2,767,407 was produced by 9 establishments, and in 1909 to the value of $2,567,267, by 15 establishments of this character.
[3]Reported as "poster" in 1914.
[4]Not reported separately.
[5]Included in "all other boards."

THE PAPER INDUSTRY IN POLAND IN 1921

L. J. Keena, American Consul General at Warsaw, has the following to say regarding the paper industry of Poland in a report to the Department of Commerce:

The low level of German and Austrian exchange in the last three months of the year 1921 removed from the Polish paper industry the artificial protection afforded by the former comparatively lower value of the Polish mark. No reduction in prices in Poland, however, was noticeable up to the end of the year. The position and some of the problems of the Polish industry in the latter part of 1921 are discussed in an article which appeared in the *Przeglad Gospodarczy* of recent rate, wherein the following observations were made by the writer:

Production in the paper industry increased considerably during 1921. In January of that year production was at only one-third of its pre-war level, and now it can be reckoned at 60 per cent of pre-war production in former Russian Poland. In Galicia the paper mills are turning out the same quantity of paper as before the war. At Bytgoszcz, in the Province of Posen, a paper mill, the only one in that district, was established in January, 1921.

The paper industry of Poland now numbers 14 paper mills, employing 4,500 hands and 21 machines. In pre-war times there were 25 machines working in Russian Poland alone. All of these mills are controlled by the Polish Paper Mill Corporation, and all kinds of paper, except very fine grades and technical and photographic papers, are produced. The production, however, is not large enough to supply the national market.

Prior to the war one-half of the Polish product, valued at 6,500,000 rubles, was exported in Russia, while paper to the value of 6,000,000 rubles was imported from Finland and other countries.

Under the present changed conditions the production of the paper mills in Poland is quite inadequate to cover the needs of the country, since the demand for printing paper has doubled, or even quadrupled. This shortage may be chiefly attributed to the lack of chemical wood pulp. The only Polish factory producing this raw material furnishes barely one-half of the quantity that the paper mills could use.

The paper mills are unable also to import from the United States sufficient quantities of lubricating oils or new machinery. Consequently the outlook for paper production in Poland at present, in comparison with pre-war production, is very poor. One result has been a great increase of imports, especially of printing paper, from Germany and Austria. Before the war those articles were imported from Finland, but now, due to the exchange difficulty, the Polish printing industry is supplied from the German and Austrian markets.

Alvah Miller Tom T. Waller Arthur C. Hastings Nathaniel L. Miller

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TRYING YEAR IN THE PAPER TRADE

Most Severe Depression Ever Experienced in all Branches of the Industry Continues Practically Throughout the Year.

Many Concerns Suffer Greatly But Practically All Weather the Storm With Renewed Determination to Share in the Improvement That Is Slowly But Surely Setting In—News Print Experiences a Year of Steadily Declining Prices—Fine Papers, Book Papers and Coarse Papers Also Experience a Very Unsatisfactory Year—Board Branch of Industry Hardest Hit of All—Conditions Improving.

Written Especially for the Annual Number by Robert P. Swift

The World War repeated history in the sense that it was the logical outcome of a series of events that had presented themselves before with similar results. The economic struggle that followed the war also has historical precedent. As the war was the greatest ever known the depression to which it gave birth was in many respects the greatest also. In the conduct of the war there was much that was new—much that had never before been encountered. In the ensuing depression new problems arose whose solution was not a part of any business man's experience.

The depression came, was faced, and has now completed its slow departure, leaving a trail of sobriety behind it, in close analogy with a certain legislative enactment. Paper interests either fell before the storm, revealing latent weaknesses, or weathered it, thereby gaining much in strength, experience, and prestige. However, the storm was so far reaching and severe withal that some very seaworthy companies were badly damaged. After undergoing repairs many of them will again be able to take up their course wiser than before and better able to continue on account of their harrowing experience.

"It is an ill wind that blows nobody good," and so the sober experience gained in the last year together with the new platform of hard work, good service, and value for price, generally adopted by the trade should operate in the future to build up the great paper industry on a firm foundation that will insure conservative prosperity for many years.

News Print

Without the color news print gave the paper industry in 1921 the picture would have been a slate gray one indeed. There was action in news print. Unusual times contributed to the rise of novel developments in its market and made possible novel results that only became apparent in some instances upon the compilation of statistics.

News print consumption upheld its reputation for steadiness and decreased 2 per cent from 1920, when it will be remembered the mills could not manufacture enough to supply the demand. This nominal change is almost uncanny when the mad rush of production in 1920 is compared with the slack mills in 1921, but the solution lies in the fact that there was no actual shortage of news print but that a panicky fear existed lest there should be one.

North American production dropped some 15 per cent in 1921. With a capacity production for North America of 2,666,930 tons, shortly to be increased to 2,756,430 tons when the new mill of the International Paper Company at Three Rivers, Que., is running full, there is the problem of disposing of the surplus over the consumption of some 2,100,000 tons. While all export trade foundered badly during the year, an awkward daub of foreign news print came to American shores, adding a contingency wholly undesirable and for which there was no provision.

The result was a general slowing down of the domestic mills and a gamut of price cutting that continued from the year's first appearance until the present when the price of $70 a ton hardly represents the production cost. It is small wonder that pessimism, discouragement, and reorganization has followed in the train of these reactionary events.

Toward the last of December the news print mart became firmer. Contributing causes were less foreign news print in general due to winter's closing the ports, and less German news print in particular necessitated by its scarcity at home. Differences in the exchange rates had made it especially desirable for the Germans to sell their product in America. Also, the large metropolitan dailies, which use most of the news print produced, began to increase the number of pages in their editions, and thereby assisted greatly in strengthening the market.

Improvement has gained until at the present it is known that consumption for December, 1921, and for January and February, 1922, was the greatest consumption ever for those months, barring no year.

Production surplus leaves little room for expansion in the industry except along lines on internal development and increased efficiency. The newest news print mills are marvels of mechanical perfection and with their high speed machines turning liquid pulp into a continuous sheet at the rate of 1,000 feet a minute, stand at the peak of an advancement which it is hoped may continue.

Fine Paper

The fine paper industry entered 1921 in a strong position verging on prosperity. Buying ceased suddenly and left printers and merchants with heavy inventories bought at close to the high level of prices. Fine paper mills paid high prices for their raw materials. Upon puncturing the bubble of inflation the resultant slow demand caused manufacturers to liquidate extensively throughout the length and breadth of their establishments and to busy themselves again with stimulating the sales management which has long been left in a neglected state.

One of the outstanding features of the irregular 1920 market was the large increase made in sulphite bonds. This grade has proved both serviceable and profitable and will doubtless continue in popularity as it has during 1921.

Cost accounts were put into gear and exhibited publicly to show that fine paper could not be made at a profit. All possible was done to lower production costs and in the main liquidation proceeded with all the distressing phenomena usually attendant. Much high rag content bond was sold for purposes which could have been capably supplied with a cheaper grade. Under the firm pressure of liquidation the high grades have found their price levels.

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Book Paper

Book paper has been most erratic during the past year with possibly more "downs" than "ups" checked against it. Balance sheets have been unable to furnish encouragement and yet in spite of all setbacks the characteristic American optimism has prevailed throughout and has maintained a morale—high under the circumstances—by means of which more has been accomplished than otherwise would have been possible.

Stability of price has been sadly lacking and the reduced buying power of the public has operated forcefully to cut down the number and volume of sales. In response to the forces of liquidation which began in the winter of 1920 prices fell steadily until the last of 1921 when a slightly firmer trend set in. Prices are considered to be as low as justifiable and are not expected to experience any untoward fluctuation for some time other than that caused by seasonal influences.

Since book paper buyers continue to take only what is needed to fill out their depleted stocks it is self-evident that they do not consider liquidation complete and as a result the market is no higher than at low ebb last year. Relief from depressing disinterest cannot come through increased prices, although such are needed in view of the necessity of present under capacity production.

Increased advertising indicates adjustment in general and gives a considerable stimulus to the book paper demand. Publishers' stocks are decreasing steadily and when low enough will occasion a period of increased activity. The demand from mail-order houses is on the rise, while direct-by-mail advertising is coming into its own again.

On the whole the present state of affairs is altogether better than for some time past. Proper legislation on questions of tariff and transportation will go a long way toward completing the improvement now well established. The export trade shows a tendency to fall off and should be catered to assiduously since the small percentage of the domestic product consumed in foreign quarters has a remarkably stabilizing effect on the home industry.

Consumption is growing slowly and is bound to continue under the impulse of the many stimuli now working for betterment until prices are stable and satisfactory and complete normalcy is at hand.

Coarse Paper

In the coarse paper field much has been accomplished in the way of readjustment and still more remains to be done. The wheels of the industry are turning now where they were well nigh motionless at the height of the depression in 1920, and so no matter what the present status of business is, whether it be one to boast about or not, in any event there has been advancement in the right direction.

The producing capacity of the mills still exceeds the demand and until production again feels the throb of renewed life and vigor emanating from the contingent of buyers there will be no solid foundation upon which to reconstruct a disorganized trade.

One of the bad phases of the superinduced competition is the harm done the industry by those mills and merchants who lack the fundamental knowledge of the cost of doing business. A good cost system can alone prevent selling a particular line at a loss, and at the same time can avoid failure which has engulfed so many embryo concerns in the last year.

Depression reached the coarse paper business in June, 1920, and since striking its low point in January, 1921, has continued to improve, but so slowly withal that this brand of the paper trade is still very much under normal. Manufacturers have borne the brunt of sharply cut prices which on the whole still range double pre-war levels and apparently warrant further reduction. Further liquidation must come either from lowered production cost or increased demand if confidence is to be assumed again throughout the trade.

The tendency at present is to sacrifice quality to attain low prices and sad to relate this tendency is a very bad one and a weed to be plowed under after each period of dullness. The ultimate results obtained by cheapening the product are never satisfactory. The demand is not increased thereby, although the situation is often demoralized. Consumers are not apt to be satisfied with an inferior product and in times of stress like the present offer a hard nut to crack to producers in demanding a less costly paper of equal or better quality than before.

The ingenuity of the modern manufacturer may be unbounded but is sorely taxed, nevertheless, in endeavoring to keep the trade satisfied. The whole situation may be lightened somewhat by finding new usages for paper and reducing the present oversupply of production in a demand created for the product. Efficient management is advised wholeheartedly if a concern wishes to weather the stormy seas of after-depression with colors still flying. Speculative opportunities should be shunned.

The progress of the year ending April 1 has been very considerable and while it may have appeared unbearably slow, the significance of its movement at any rate however timid reveals wholehearted co-operation and endeavor by all interested in coarse paper.

Box Board

Box board probably suffered more during 1921 than any other branch of the paper industry. The account of its life during the period is a difficult thing to construct inasmuch as high authorities considered board to be wholly dead throughout the period.

Few changes in the supply and demand balance were registered and many mills were closed. Some plants are in operation again but others are still waiting to have the cobwebs removed. Prices were highest in January, 1921, and fell slowly and steadily during the year with only minor shifts in the opposite direction. The diminished buying power of the general public was the basic cause of the prevailing quietude throughout the year. The fact that 300,000,000 individuals in Europe and America found their buying capacity cut in less than half could only mean that demand must lag and that those engaged in supplying the demand must bear the burden.

The board industry is one that must do business on a large scale in order to obtain a profit.

The stubborn hand to mouth demand played havoc with dispositions and profits alike and it was in full realization that it was impossible to operate without loss that most of the board mills throughout the country were closed for fractions of the year.

Inquiries are becoming more numerous and orders are in better volume than for some time and in fact the industry seems to be coming out of the long-enshrouding gloom at last.

Wood Pulp

Wood pulp is the basic constituent of about 90 per cent of the paper and board manufactured and so the condition of its market has at all times a most important bearing on the whole paper trade. The wood pulp business has on the whole held up well under the improvident strain put upon it by the late depression and has provided a foundation to which the more unsettled departments of the paper industry could look for support.

Reduced buying power during 1921 was reflected by a decrease in pulp production of 19 per cent from that of 1919, which is a better year for comparison than 1920 on account of the undue inflation which then existed.

Pulp prices broke during the first quarter of 1921 under the influence of an inactive paper market, large stocks of pulp on hand, and the apparent anxiety of owners of pulp to convert their stores into cash as rapidly as possible. Losses were sustained in some quarters in the rush to get out from under, but conditions improved toward the last quarter and the market became firmer and better prices obtained.

The wood pulp business was not a profitable one during 1921, as many reports penned in red ink clearly indicate. Many mills were remodeled and reconstructed during the war boom and these have

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LIBERTY PAPER MILLS
A. P. W. PAPER CO., ALBANY, N. Y., U. S. A.

DIMENSIONS OF BUILDING 260 FT. X 300 FT.

The paper manufacturing plant of the A. P. W. Paper Co., known as Liberty Mill is situated in the north section of the city of Albany at No. 12 Lumber District on the bank of the Hudson River.

The location was chosen primarily on account of its proximity to a large converting plant recently built by the Company. This enables the owners to have constant supervision over the character and quality of their output from beginning to completion and to furnish to their customers a product that would represent a standard which their many years of experience had shown them to be uniformly satisfactory to the trade and to guarantee to the users of toilet paper and towels service and dependable qualities in any brand carrying the name of the Company.

Happily the choice of location also gave shipping and power facilities which assured a favorable cost in manufacture and which coupled with the special design and equipment of machines, excelling in every way the most modern of their time, allow the Company to produce and market the most satisfactory toilet and towel papers at normal cost to the user.

The mill is a single story structure, concrete and brick, 300'x260'. Mechanical installations include pulp grinders of capacity of 18 tons a day and eight paper machines which produce 10,800 tons of paper annually. Everywhere is cleanliness and efficiency. High speed cylinder machines of special design produce a daily tonnage of paper in a combination of quality and quantity unequalled in the United States.

The machines and their power elements are built from special design which admits of the finest materials only in their make-up. Ball and roller bearings are used exclusively. Friction and power loads are only a small percentage of normal requirements. Only water from driven wells is used in the process of pulp and paper manufacture, pure to the standards of city and state requirements for drinking purposes.

Employees are in full knowledge of standards required and all papers are held to their specifications for strength, formation, cleanliness and finish. We have no hesitancy in repeating the words of every man in the industry or with knowledge of paper mills in general who has visited our plant "The finest and most up-to-date paper mill in the world."

universally felt the hardship of readjustment and have been obliged to undergo refinancing and to close down in some instances.

As a result of the enforced liquidation costs have been carefully checked, overhead has been cut down wherever practical, and all possible has been done to improve the situation. The lessons learned from the late trend of events that have never been seen before and probably will never be seen again, will leave the wood pulp business sadder but wiser and more capable of conducting itself on lines of hard work and conservatism which in the last analysis are most dependable.

Rags and Waste Paper

Only occasional spurts were seen in the rag and waste paper markets during 1921, for the depression starting in 1920 carried over into 1921, where its heavy hand was felt throughout the twelve months.

Efforts were made early to protect American merchants against the cut-throat competition from abroad made possible by reason of the great disparity of the exchanges, but most of the work proved abortive and enough "dumping" took place to thoroughly disheartea the trade. A rout resulted in price schedules and individual quotations meant very little on the whole since they were continually altered when sufficient pressure was brought to bear. High freight rates were a destructive factor and tended to shut off many markets that had previously been fairly fertile fields.

When values fell under the cost of production collections were discouraged and there came to be comparatively small volumes of many waste papermaking materials on the market. Any sudden and panicky demand would surely have found the supply inadequate and would have scaled the prices upward.

Low prices reigned throughout the year until September when a firming up movement took place, followed by a slight reaction in November that left things very quiet until January. While the state of business has not been anything to boast of since January, what advance was established has held and the present outlook is for greater activity and fundamental improvement.

HINDE & DAUCH FORT MADISON MILL NEARLY READY

Written Especially for the Annual Number by Howard P. Hall

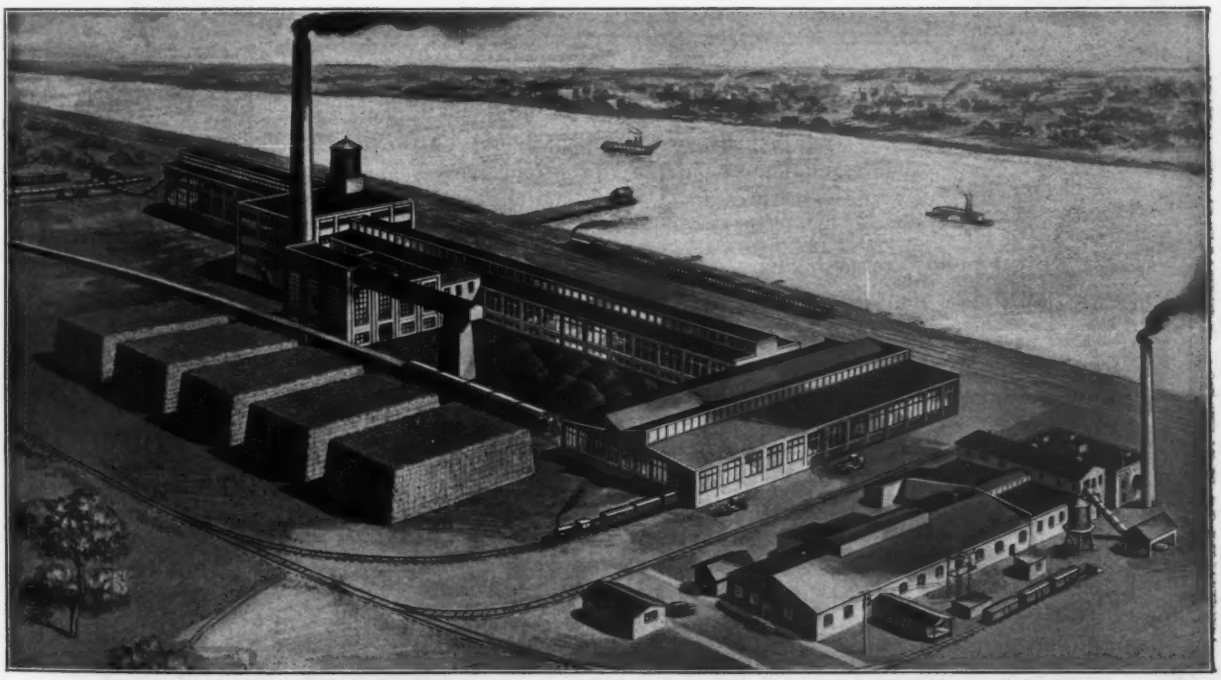
The new mill of the Hinde & Dauch Paper Company at Fort Madison, Ia., erected for the manufacture of straw paper for corrugating purposes, is nearing completion and will soon be in full operation. As shown in the illustration, it immediately adjoins the company's No. 1 mill, both being located on the banks of the Mississippi River.

The new mill is a fine structure throughout, being of steel, concrete and brick and is practically fireproof. The rotary room is 136 by 48 feet in dimensions and is equipped with 12 rotary cookers. Adjoining is the beater building, a three-story structure, 67 by 107 feet in size. It has seven 1,500-pound beating engines, three mammoth refining engines and twelve washers.

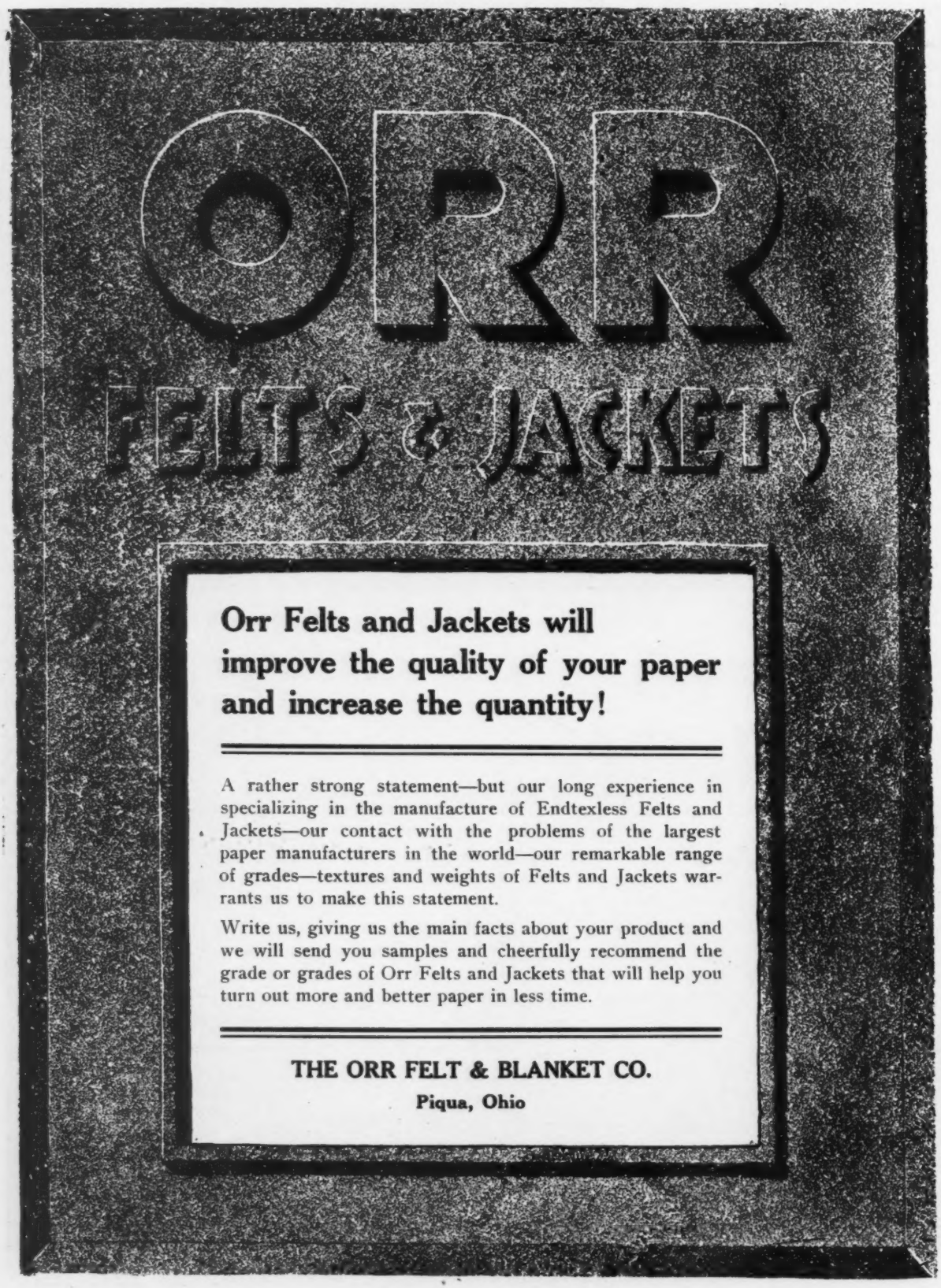
The machine room is 300 feet long by 47 feet wide and contains the 142-inch Fourdrinier paper machine, widest trim sheet being 130 inches. Next in order is a building for paper storage, one story high, 114 feet wide and nearly twice as long. Both steam and electricity are used for power purposes. The electrical energy for power distribution system is furnished by a large Turbo generator driven by three Sterling water tube boilers. The stokers are fed by automatic conveyors. The power house is 95 feet long and 65 feet wide. Immediately adjoining is ample storage room for a large supply of coal.

The new mill will have a capacity of 150,000 pounds of finished product in 24 hours. It is well situated with regard to raw material, and, in addition to Mississippi River transportation facilities, is served by the Burlington and Santa Fe Railroad systems.

Hinde & Dauch's mill No. 1, also at this point, is in operation regularly and produces 38,000 pounds of strawboard daily. It has a 78-inch cylinder machine, one Jordan, one Claflin refining engine, four 1,100-pound beaters, eight washers and four rotary boilers.



NEW MILL OF THE HINDE & DAUCH PAPER COMPANY, FORT MADISON, IA.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A Year of Declining Prices in News Print

Publishers Responsible for the High Spot Prices Which Ruled During and Previous to 1920—Contract Prices Have Been Steadily Coming Down Since the Conclusion of the War—A Considerable Influence in the Reduction of Contract Prices Has Been the Reported Prices of Paper Imported from Scandinavia, Finland and Germany—Consumption Greatly Increasing and the Outlook Is Decidedly Better.

Written Especially for the Annual Number by Col. W. E. Haskell, Vice-President International Paper Co.

Instead of volplaning gently and gradually from the heights of activity of 1920, the news print industry made a nose dive almost at the beginning of 1921, which was as startling to the pilots of the industry as it was to the observers. The demand for news print suddenly slackened in spite of the fact that actual consumption of standard news for the whole year decreased only 2 per cent. The actual decrease in production was 19 per cent in the United States and 8 per cent in Canada, making a weighted average of 15 per cent decrease in the production of the two countries. This means that, while consumption of standard news decreased but 41,000 tons in the United States during the year, the production of the United States and Canadian mills was less by 354,000 tons.

No Shortage of News Print

When it is remembered that during 1920 the demand for news print was almost hysterical, and the mills running steadily at above normal capacity could not produce enough paper to satisfy the demands of the consumers, it is hard to understand why the demand should have so suddenly slackened when actual consumption was only 2 per cent under that of the previous year. It was not until the full statistics of 1920 were assembled, however, that it was learned that there was not a shortage of paper during 1920. These statistics, when assembled, showed that with the production of the United States' mills and the importations from Canada and abroad, there was available for United States' consumers, 2,034,000 tons of standard news. The actual consumption for the year was 1,943,000 tons. Consequently, there were 91,000 tons more news print available than was consumed, proof positive that there was no real reason for the wild scramble for paper and for the creation of the excited spot market, which worked such hardships on the small publishers.

Publisher to Blame for High Spot Prices

As a matter of fact, the responsibility for the 1920 spot market in news print and all of its attendant evils and sufferings must be laid at the door of a few wealthy publishers who, with the bulk of their requirements covered by contracts at a low price, were willing in their eagerness for protection against an apprehended shortage to go into the market and pay an extravagant price for still more tonnage. Direct evidence of this is contained in the report of the hearing before a sub-committee of the Committee of Manufactures of the Senate, May 12, 1920, in which a prominent and wealthy publisher testified that, in spite of a contract at 4½ cents a pound for a greater tonnage than he had ever used before in one year, he went into the open market and was willing to pay 12 cents a pound for additional tonnage merely as a safeguard, without any regard for its effect on the smaller publishers who, perforce, were dependent upon the spot market for their supplies.

The contract price for news print for the first quarter of 1921 averaged the same as for the last quarter of 1920, viz., $6.50 a hundred, or $130 a ton. For the second quarter of 1921, it dropped to an average of $5.50 a hundred; for the third quarter, to $4.75 a hundred, and for the last quarter to $4 a hundred. And, in the last quarter of the year, the contract price for the first quarter of 1922 fell to an average of $3.50 a hundred, or $70 a ton.

Thus, it will be noted that the contract price of news print, which began to rise in 1916, forced by the upward pressure of manufacturing costs, took four and three-quarter years to reach its peak, while it was reduced by the manufacturers from the peak of $130 a ton to $70 a ton in the short period of nine months.

Foreign Competition

It must be admitted in fairness that this rapid reduction in contract prices was influenced to a greater or less extent by the low prices for paper imported from Scandinavia, Finland and Germany, which were ballyhooed from one end of the country to the other. On account of depreciated currency and low westward freight rates, paper from the countries named was offered openly at seaboard points at less than the cost of manufacture in the American mills.

The total imports from overseas for the year 1921 amounted to 135,321 tons, or an average of about 11,277 tons a month.

While this tonnage in itself was not sufficient materially to affect the market, the low prices quoted demoralized the trade and unsettled regular customers by giving them false ideas of values.

This invasion of the American market by overseas tonnage was needless and unwarranted, as new machines installed in the last two years have brought the total rated capacity of the mills of the United States and Canada to 2,666,930 tons a year, with consumption in both countries not over 2,100,000 tons a year. This figure is based on 310 working days a year, and it will be increased to 2,754,430 tons a year when the new mill of the International Paper Company at Three Rivers, P. Q., Canada, is running full.

The Influence of Strikes

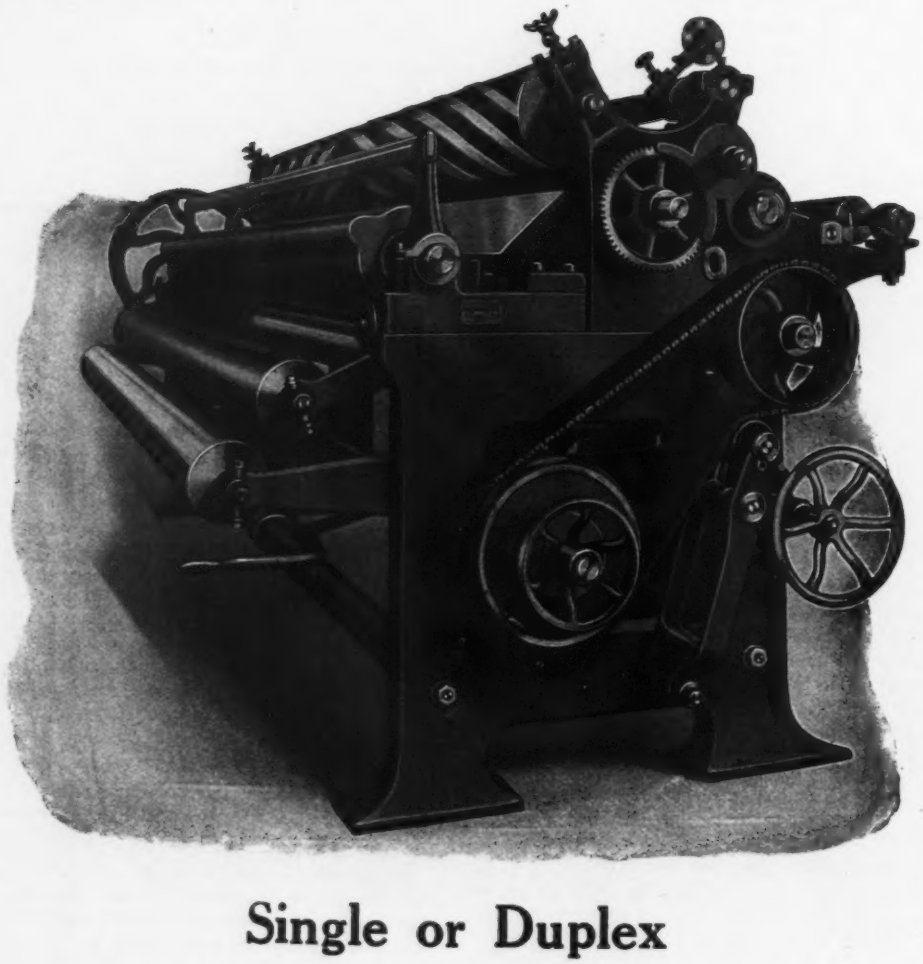
Among other industrial features of the year was the strike at the mills of the International Paper Company, which began on May 1, 1921, and lasted for several months. The non-operation of the mills on this account reduced news print production by the International Paper Company to 139,000 tons, as against 304,000 tons for the year 1920.

Increasing Consumption by Publishers

A factor that has a strong bearing on the future outlook of the news print industry is the increasing consumption of paper by the publishers. While the total consumption for 1921 was 2 per cent below that of the previous year, this loss was sustained largely in the first nine months of the year.

The official circulation statements, which appeared October 1, 1921, showed a general marked increase in circulation, and the record of the average number of pages printed per issue began to show an upward tendency. All this resulted in a consumption in November, 1921, about 2 per cent larger than that of the corresponding month of 1920, while this increase advanced to about 4 per cent for December, 1921.

Extra Heavy Type Cutter



Single or Duplex

HAMBLET MACHINE COMPANY

LAWRENCE, MASS.

At the present date, the records which are complete for January and February show that the increased consumption of the two months of 1922 over the corresponding period of 1921 has been 10.6 per cent.

These records, which tend to encourage the belief that the growth of consumption may soon more closely approximate production and thus strengthen and stabilize the market, are due to the efforts being made by the publishers to secure larger circulation in order to maintain their advertising schedules and to the loosening-up of the tight papers, which were the rule during the war and the period of the higher contract prices for news print.

High Priced Raw Material

In the meantime, the manufacturing costs nowhere on the continent have sunk proportionately with the selling prices. All large producers, exercising their best judgment in view of market conditions and future prospects, loaded up heavily with pulpwood during 1920 at the prices then obtaining and found themselves during 1921 heavily stocked with high priced raw material and with a lessened demand for their product at softened prices. Wood inventories were marked down substantially at the close of the year, to the great loss of the manufacturers, but were still left at a level that prevented a large decrease in manufacturing costs. The prices of some mill supplies have been reduced an average of about 50 per cent, but labor has been but slightly liquidated and the average mill employee wage is still 99 per cent above that of 1915.

It is an open secret that news print paper cannot be made profitably for $70 a ton at the present level of manufacturing costs. While efforts are being made on every hand to reduce costs and to secure a maximum of economy in all woodland and mill operations, it is manifest that the best results in these directions that can be achieved, will not, for a long time, justify contracts at a price as low as the present quotation of $70 a ton. The discouraging influence on production of this low price is already shown by the fact that only 65 news print manufacturers are now making their monthly reports to the Federal Trade Commission, as against 88 who were reporting a year ago. This means in some cases the closing down of mills on account of financial difficulties, and in other cases, the diversion of machines from news print to other grades of paper, which can be manufactured at a reasonable profit and which receive some measure of tariff protection against the low-cost competition of other countries.

On the other hand, the hardening of the market for raw material in the near future, which is strongly indicated, and a continuation in the increase of news print consumption, may necessitate a higher price for news print before the beginning of a new year.

IMPROVEMENTS AT MILL OF P. H. GLATFELTER CO.

During the past three years, the mills of the P. H. Glatfelter Company at Spring Grove, Pa., have undergone extensive remodeling both in buildings and machinery. The mill buildings have nearly all had new roofs of steel and gypsum; the basements have been improved and the floors have been remade of concrete and special composition.

The pulp mill has been greatly improved by rebuilding the bleaching house and digester building, in which steel chip bins have been constructed over the digesters. The use of liquid chlorine has replaced the old method of using bleaching powder.

A new filter plant of six and one-half million gallon capacity is nearing completion.

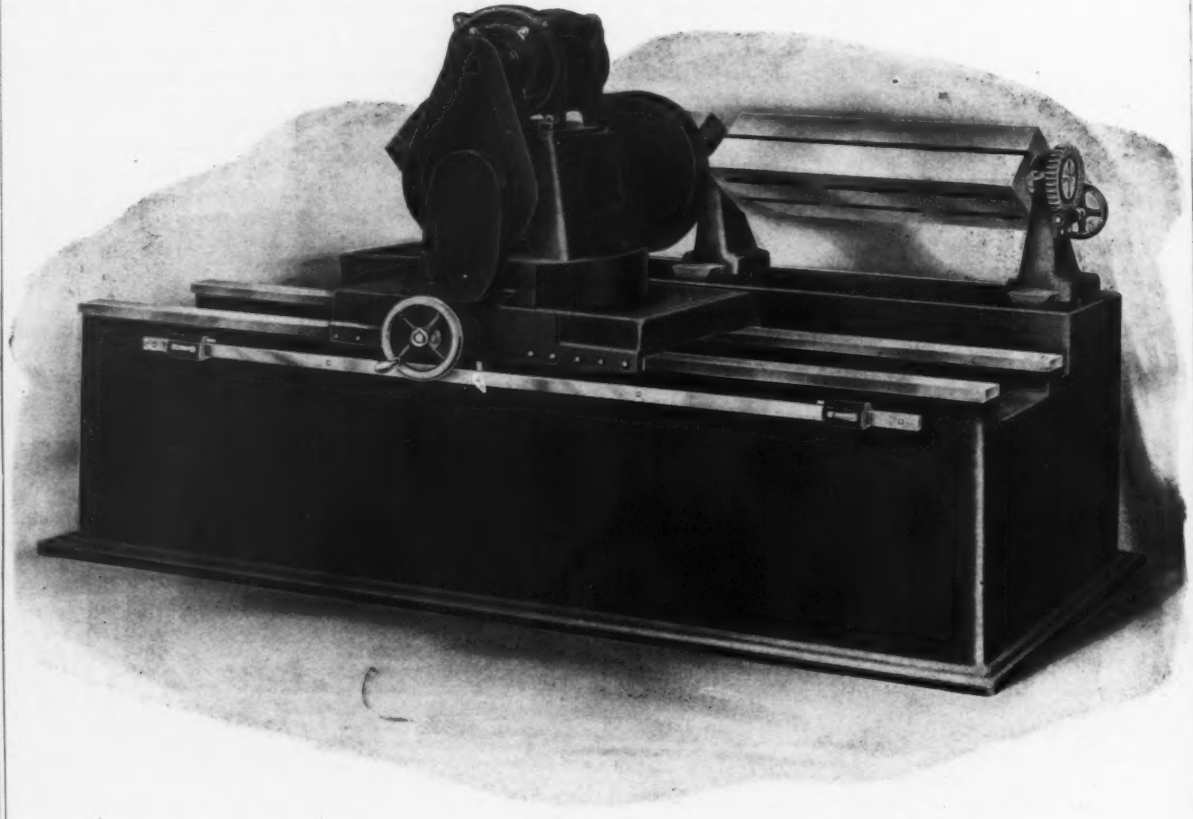
The present building program will not be completed until this summer. The Aberthaw Construction Company of Boston is building in accordance with plans prepared by George F. Hardy of New York, a new mill about 475 feet by 100 feet. The building will have a new paper machine and beaters, and considerably increase the storage facilities of the plant. The Black-Clawson Company, of Hamilton, Ohio, is building a machine, trimming 156 feet and designed to operate at a speed of 600 feet per minute. The General Electric Company is furnishing a sectionalized drive. When these additions are completed, the capacity of the plant will be practically doubled.

NEW BOND ISSUE FOR BOOK MILL

In connection with the erection of the new book paper mill at Port Arthur, which was begun last week by the Provincial Paper Mills Company of Toronto, it is announced that new financing is planned, and the details of the bond issue are expected to be announced shortly. The company, which is capitalized at $5,200,000 preferred and common stock issued, has a funded debt of only $565,000, which is proportionately very small as the distributions of capital liabilities go. During the past year the company earned its bond interest more than eighteen times over in a period of general depression. In the preceding year when business was more active, the bond interest was earned more than thirty-six times over. In reference to general conditions, I. H. Weldon of Toronto, president of the company, says all the mills are running to full capacity.

Mill of P. H. Glatfelter Company, Spring Grove, at Which Many Improvements Have Been Made During the Year.

New Grinding Service for Paper Knives



Saves floor space, saves upkeep expense, saves in original investment. Our latest developments in full automatic grinding of paper knives embody the most compact, massive, and lasting type of construction yet developed in this class of service. Simple design, few parts to wear, yet full automatic and accurate to the highest degree.

For latest developments in economical, accurate knife grinding service, apply to

Machinery Company of America

Big Rapids, Mich., U. S. A.

Branch: 534 First Ave., South, Seattle, Wash.

An Unsteady Situation in Book Papers

Taking Into Consideration Machine Capacity and Actual Production and the Law of Supply and Demand, Not Much Was to Be Expected During the Past Year in the Way of Price Stability, Nor Could Buyers of Book Papers Be Expected to Provide for Their Requirements Freely — Increasing Advertising, Decrease in Paper Merchant's Stocks and Other Signs, Now Point to Improvement.

Written Especially for the Annual Number by D. W. Pratt, Mgr. Mill Dept., Butler Paper Corp., Chicago

"Has the worm turned?" That seems to be the first question asked by merchant or manufacturer, when the subject of conditions in the book paper industry is mentioned. The answer given to that question during the past few months, has usually been based upon the success one or the other had met with in booking one or two fair sized orders the day before. If successful, the true American optimism would assert itself and the merchant with a sale to help out on his overhead, and the manufacturer with an order or two to run a machine another day, would answer to the affirmative. The most optimistic might give the same answer, even though no sale had materialized, basing his opinion on the possibilities of procuring some business as a result of fair sized inquiries on which he was figuring.

The Silver Lining in the Clouds

In view of the conditions that have prevailed, I feel we should be thankful that the majority of those engaged in this branch of the industry, have been able to see a silver lining in the clouds, even though a perusal of the monthly balance sheets offered no encouragement to an optimistic view. Taking into consideration the statistics of machine capacity and actual production and the infallible law of supply and demand, we can readily see that we could not expect much in the way of price stability during the past year, nor could we expect the buying public to purchase their book paper requirements freely.

Practically every commodity had suffered a tremendous liquidation in price and a watchful waiting and economy program had been universally adopted by business houses. Book paper prices started downward in the winter of 1920 and there were marked declines during the early part of 1921. These continued, although not so drastically, up to the fall months. At different intervals, particularly during the latter part of November and early December, there was a tendency on the part of some manufacturers toward a slight increase in price; this due to a slight increase in demand and a notification of an increase in the price of bleached sulphite. Regardless of the fact that manufacturing costs warranted it, the buyer of paper, not convinced that liquidation had been fully accomplished, refrained from buying beyond his absolute necessities. These were not of sufficient volume to have a stabilizing effect and consequently, the market today is no higher than at its lowest ebb during last year.

Where Relief Can Be Looked For

In my opinion, the spread between machine production capacity and actual consumption today, is so great that we cannot look for relief through increased prices, as here we run into the law of supply and demand again and it has been demonstrated that this fundamental cannot be circumvented.

With this avenue of relief shut off, what then can we look forward to and how long must we wait before this branch of our business will be on the proper basis? This is a hard question to answer but an analysis of different factors having a bearing on general business, as well as pertaining particularly to our own, may help some.

In the first place, we all have confidence in the possibilities of our country being an industrial center second to none., and believe in the statement made by a prominent Chicago banker once, to the effect that he had never yet gone short on the U. S. A. and did not intend to.

Our business structure has been operated upon for a severe attack of gout, contracted during the war period. The operation although painful was successful and though leaving the patient very weak, with the proper care and attention, he can be nursed back to perfect health. There probably will be a few scars showing but those can be gradually outgrown. Money is more plentiful and obtainable for sound projects, at a more favorable interest rate. The foreign situation, while still in a critical condition, shows signs of improvement.

Advertising Increasing

The book paper business is, of course, largely dependent on advertising in all forms. During the year 1921, with economy as the watchword, large advertisers drew in their reins and this was immediately felt by the book paper industry. Large stocks had been accumulated by publishers, which carried them over a considerable period, taking into consideration their smaller consumption. However, in carefully watching the number of pages contained in the various large space advertising media, a general increase can be seen. This demonstrates, that business in general is adjusting itself to a new order of things, has ironed out a lot of troubles encountered during 1921 and is on the road to a definite goal.

Mail order houses, who are large consumers of book paper and who, like the publisher, had tremendous stocks the early part of the year, have liquidated them and have gradually straightened out their financial affairs and are on the upward grade toward issuing their regular quantity of catalog and other promotion matter.

Direct-by-mail advertising pieces are becoming a little more numerous as is natural when space advertising increases.

The large printing shops, while not all running full, have been encouraged by the reports of their solicitors relative to the possibility of a gradual improvement.

Paper merchants' stocks have been liquidated and in general there is an improvement over last year in sales out-of-stock.

The Worst Over

All of these factors tend to show that the worst is over and that we are at the bottom of the ladder looking up rather than at the top or half way looking down.

We have before us some reductions in taxation; a probability of a reduction in freight rates and possibly some other slight reductions in operating costs.

We should watch the export possibilities very carefully and even go to some length to meet conditions abroad when it is at all possible, for the reason that the 10 or 15 per cent of our total

J. L. McEWAN
Vice President and
General Manager

ARTHUR McEWAN
President and Treasurer

R. W. McEWAN
Secretary and
Asst. Treasurer

McEWAN BROTHERS

MANUFACTURERS OF

NEWS AND FOLDING

Paper Box Board

Capacity 200 tons daily
Trim 104″ and 138″

Office and Mills at Whippany, N. J.

Eden Mills and Lining Plant

TELEPHONE CONNECTION

production which might be exported, will have a tremendous stabilizing effect on the market at home.

Further than this, we can always figure on a gradual increase in consumption by the home market. This has been the history of the paper business as is shown by statistics covering a long period of years.

Should Stick to Prices

We should all do everything in our power to eliminate the practice of saying, "6 cents is my price but what will you give me?" If we are going to take an order at a certain figure, make that price and stick to it. This will permit all of us to know where we stand and conduct our business on a better basis.

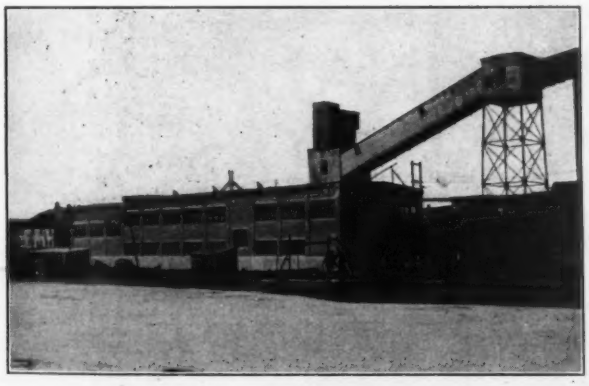
If the spread between production and consumption will not permit of prices which will show a reasonable margin of profit, the only course to pursue is that of letting the encouraging factors mentioned bring us out of the woods. This it would seem is a much sounder basis than to take some step which, while possibly giving temporary relief, will in the end cause us to slip back and lose the ground we have gained.

GROVETON PAPER CO. IMPROVEMENTS

During the past year the Groveton Paper Company, Groveton, N. H., has completed many improvements and additions which make for quality, economy and increased production. In the latter part of 1920 the construction of a modern concrete, brick and steel wood room was begun and was in operation November 18, 1921. The pulpwood is first cleaned by an American barking drum, after which it is sorted to splitters, knife barkers, or hand cleaners for final treatment.

The equipment includes two 90" Union Iron Works chippers, two Ryther & Pringle chip crushers, two 78" Waterville screens, and a Ball & Jewell rechipper. This equipment is arranged in two independent units. The chips are sorted into two sizes and the smaller-sized chips are given a second screening in rotary sawdust screens. The large chips are conveyed through a bridge to three digesters and the small chips go to a fourth digester; the system, throughout, is very flexible and has a capacity of 150 cords in nine hours, with provision made for easy expansion to 200 cords.

The new boiler house as here shown is equipped with two 600 h.p. Heine boilers and superheaters, over two Coxe stokers burning anthracite screenings. The coal is fed from an overhead bunker to the stokers, and the ashes are dumped from the ash-pit direct into a standard gauge ash car. Forced and induced draft fans are aids in close regulation and economical operations. One Green economizer serves both boilers. In connection with the new boiler



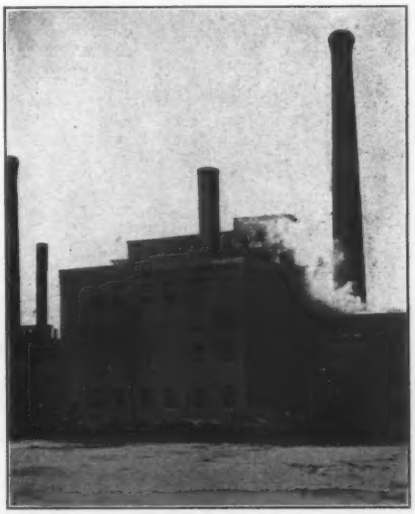
New Wood Room, Groveton Paper Co.

house a generator building has been erected housing one 2,500 k.w. Westinghouse-Parsons steam turbine generator, with complete condensing equipment; also an 800 k.w. Westinghouse frequency changer to insure flexibility of the new 60 cycle current, and the 40 cycle current generators, by nearby hydro-electric stations.

ALLIED PAPER MILLS IN NEW YORK

The Allied Paper Mills, of Michigan, have held a very successful meeting, with the paper dealers of New York City—successful because their plans, as announced, were interesting to the dealers and quite generally approved by them.

The company wished to come into New York and they very much wished to come in the right way—and after determining what they thought to be the right way, completed their plans, and then invited the paper dealers of New York City to meet with



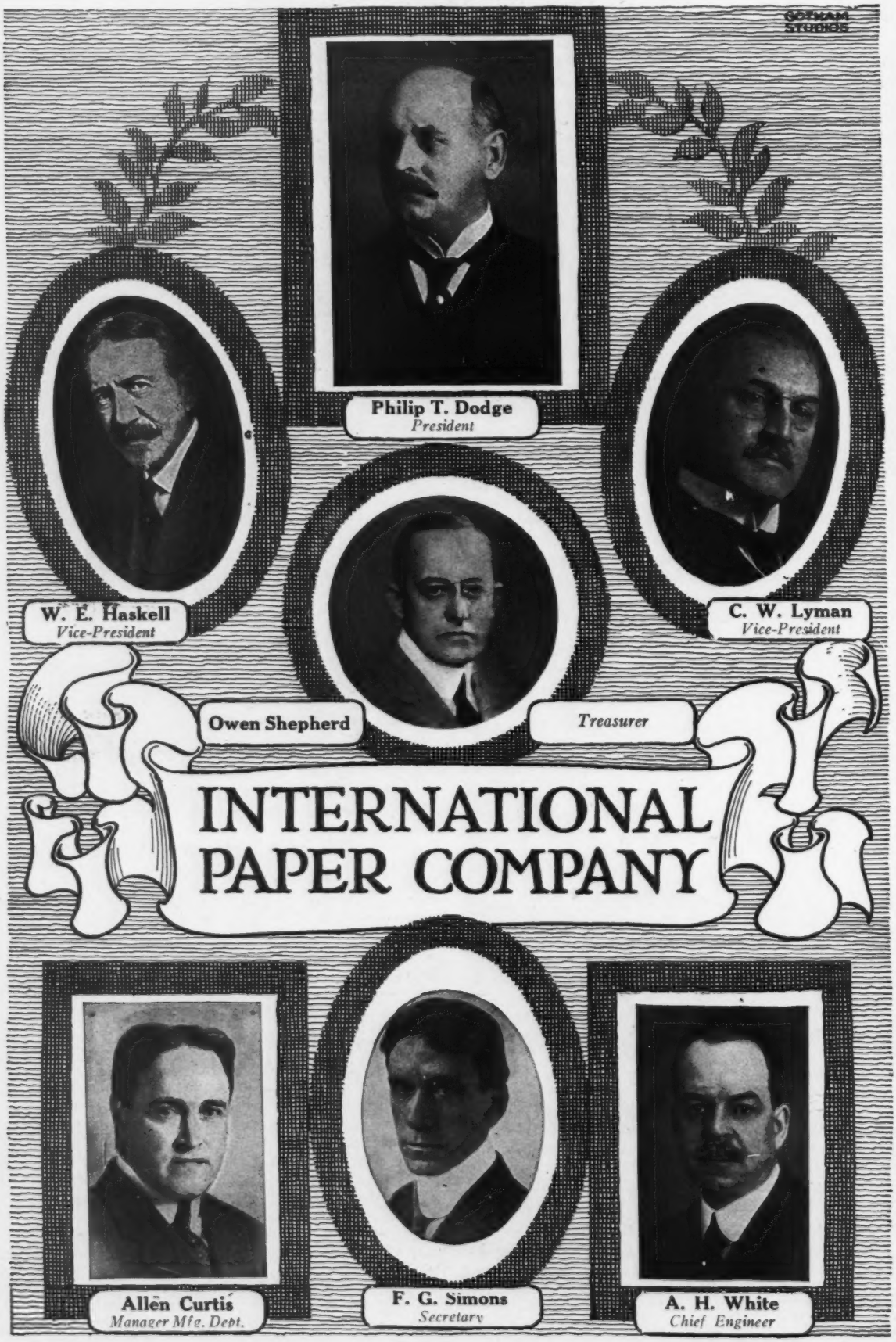
New Boiler House, Groveton Paper Co.

them. The meeting was held in the Assembly Room of the Waldorf and it is very gratifying to the company, that some sixty houses were represented.

It was made known to the paper dealers that the company had purchased a warehouse located at 38th street and 11th avenue, on the railroad tracks, through which they would offer their papers, in stock sizes and weights, and from which the management of their affairs for New York City and the Eastern territory will be conducted, as their office will be located at the warehouse. By the middle of June rather a complete stock will have arrived.

The Allied Paper Mills own and operate three mills, The King Paper Company, The Bardeen Paper Company, and the Monarch Paper Company, so that their equipment is very large—10 paper machines and 34 coating machines—enabling them to serve the trade quickly, and to make many specialties in addition to their regular perfected grades. Their confidence in the value of their papers and in their ability to successfully market them is shown by the fact that they have bought a warehouse, through which they can sell economically to the benefit of the trade.

A further announcement is that a New York corporation has been formed under the name of The Allied Paper Mills, Inc., of New York.


GOTHAM STUDIOS
Philip T. Dodge
President
W. E. Haskell
Vice-President
C. W. Lyman
Vice-President
Owen Shepherd
Treasurer
INTERNATIONAL PAPER COMPANY
Allen Curtis
Manager Mfg. Dept.
F. G. Simons
Secretary
A. H. White
Chief Engineer

Breaks and Rallies in Fine Paper Trade

These Occurred During the Past Year in Total Disregard of Manufacturing Costs and Precipitated Readjustments Not Only by the Mills But Among the Paper Merchants—Among Manufacturers the Liquidation Extended All the Way From the Wood Pile and the Rag Room to Pay Roll While the Manufacturers Wrote Off Depreciation and Merchants Directed Attention to Sales Management.

Written Especially for the Annual Number by Bryant Venable, Secretary of the Whitaker Paper Co. and Assistant to the President

In reviewing the fine paper industry for the eventful year 1920, the writer in the last annual number of the PAPER TRADE JOURNAL commented upon the fact that the high prices of fine papers for 1920 were in inverse proportion to technical and commercial excellence of product, and that no small part of the profits taken on the seller's market would of necessity be offset by losses incident to the period of deflation. No extraordinary economic vision was required to foresee the swing of the pendulum. Yet, even in this case, foresight was less keen and accurate than hindsight. The fine paper industry entered the year 1921, if not on the crest of the wave of prosperity at least very close behind it. Although everybody recognized that an ebb must follow the flood, it is now apparent that the industry, as a whole, failed to recognize the danger signals and to reverse its course in time to avoid the breakers. The abrupt stopping of the buying movement that had been practically uninterrupted for the preceding years left printers and merchants with heavy inventories of fine papers bought at or near the top of the market. Fine paper mills, perhaps not so heavily stocked with finished merchandise, were, generally speaking, heavily committed to buy raw materials, many of them at fairly stiff prices. Speculative inducements were conspicuously absent and prices underwent a series of breaks, partial rallies and more breaks in total disregard of manufacturing costs, thus precipitating the inevitable readjustments not only in the mills but also among the merchants. Among the manufacturers the liquidation extended all the way from the wood pile and the rag room to the payroll while merchants gamely wrote off inventory depreciation and directed their attention seriously to the long neglected art of sales management.

Demoralizing Influence in Other Lines

During the early months of the year the fine paper market was sympathetically affected to an appreciable degree by the demoralizing influence then so much in evidence in the pulp market and in the news print and book paper lines. Inflation in these grades, particularly in news print, had been very much more pronounced during 1919 and 1920 than in the fine paper market. The reaction was, therefore, correspondingly greater when the break came. Not only did the foreign demand for these grades of American manufacture disappear but a very considerable, although probably over-rated tonnage of foreign manufacture was freely offered in New York at prices that determined the market even though they did not actually divert a great deal of domestic business to European mills. Not until domestic and Canadian mills had met these European prices for news print, thus eliminating the ever-present bogy of cheap foreign competition, did the general paper market effectively stiffen and assume the appearance of stability.

Enormous Gain in Sulphite Bond

Not the least interesting phenomenon of the spectacular market of 1920 was the enormous gain registered by the sulphite bonds. No small part of this gain will probably be permanent, as these grades have demonstrated their complete adaptability to many commercial requirements formerly supplied almost exclusively by papers of higher grade. The financial embarrassment of certain important Canadian sulphite pulp mills in the early part of 1921 had a disturbing influence on the entire fine paper market. Between rumors of the possible dumping of their finished pulp or conversion of their wood pile into cash, regardless of manufacturing costs, and the contrary rumors of their indefinite retirement from productive operation, thereby leaving the sulphite market practically non-competitive, there was a temporary nervousness and erratic tendency to be noted in practically all converting mills. Merchants and printers alike, however, taking their cue from the consuming public, manifested so little interest in the rumors either way that the process of price leveling may be said to have continued practically throughout the year along natural lines and with comparatively little evidence of hysterical influences.

An Orgy of Advertising

The prodigal years of the war and immediately thereafter witnessed an orgy of advertising, much of which was apparently dictated by the desire to evade the payment of excess profit taxes quite as much as by any rational plan of insuring normal profits on future operations. Newspapers and periodicals of general circulation were the natural and obvious media for most of this publicity, a fact eloquently attested by the ponderous size of almost every such publication at that time. The shrinkage in this kind of advertising has been equally marked and is equally subject to verification. Direct mail advertising and the use of fine papers generally were greatly stimulated by the record-breaking publicity campaigns of the boom times; but the reaction toward more businesslike methods of advertising was relatively more favorable to the fine papers than to the book and news grades. The year 1921 saw not merely a revival but a substantial advance in direct mail advertising. This does not mean that there was a net increase in the actual tonnage of direct advertising pieces delivered through the post office, but rather that there was a general swing of merchandising sentiment to the cause of direct mail advertising, a sentiment focused and made luminous at the direct mail advertising convention that was held in Springfield, Mass., in October. Undoubtedly, the influence of the publicity campaigns of fine paper mills, dating back over a period of several years, was an important factor in selling the advertising public on the idea of the importance of the business message, delivered with the dignity and impressiveness of a private communication. Undoubtedly, too, the relatively larger use of direct-by-mail advertising, during the year 1921 materially offset the shrinkage in ordinary commercial consumption of fine papers for letter heads, invoices, factory forms, etc.

The Factors of Finance and Commerce

In common with most other branches of American industry, the fine paper trade was very materially influenced by the complicated conditions of international finance and commerce. The enormous foreign demands that had so bolstered up prices during the previous

Typical Heiskanen Bleaching Plant Installation

Manufactured and Installed by

STEBBINGS ENGINEERING MFG. CO.

518 Light & Power Bldg., Watertown, N. Y.

Write us regarding savings and improved product obtained by use of this Bleaching System

two or three years died a sudden death, particularly in those countries that had been most acutely affected by the war. Even where the demand persisted, the ability to pay was generally lacking. Where there was both demand and money, as in the case of the Australasian market, the offerings of European mills, many of which got back into production on a high quality basis with remarkable speed, aided by preferential tariffs, more favorable rates of exchange and more advantageous ocean freight service, very largely replaced American goods. The immediate effect of the disappearance of our foreign market, simultaneous with the collapse of the domestic demand was to reverse completely the manufacturing and market conditions to which the industry was geared. Manufacturers not only studied their cost records, but actually showed them to their distributors and even gave them to the press for the purpose of demonstrating that their goods could not be manufactured and sold at a profit if prices were to go lower. Nevertheless, as we stated in the PAPER TRADE JOURNAL one year ago, the cost of production determines selling prices only on a rising market, but falling prices, when based upon curtailed demand, inevitably bring down the costs of production. This has been the case during the past year. During the early months of 1921, there was almost no market for high priced paper. The printers were primarily concerned with liquidating the stocks they had carried over from the previous year and many a case of 100 per cent rag bond was used for work that would have been done satisfactorily on a high grade sulphite or 25 per cent rag sheet. This bear pressure on the higher grade papers continued for several months with the inevitable result. The cost on the high grades has apparently found its level, and, with the possible exception of the sulphite bonds, prices of fine papers generally are apparently on a stable basis. At this writing, February, 1922, sulphite bonds are probably selling at prices lower than can be justified by mill costs, and therefore, with the anticipated improvement in general business, there is probability of some advances in the prices of these grades.

A Moral Liquidation

Such in brief is the story of the fine paper industry for the year 1921 in so far as the story can be told in terms of supply, demand, cost and price. These, however, are the unstable, the transitory, the accidental factors in any industry. Taken by themselves they reveal the operation of no new economic principle; they teach no lesson that the student of industrial history did not know before; they register neither progress nor retrogression for the industry, although they undoubtedly point to heavy immediate losses to many of the individual members of the industry. Were our story to stop with this bare narrative, the essential outlines of which were foreseen by economists and statisticians as early as the summer of 1920, it would be of small value to the reader, to whom history is interesting only as a guide for future conduct. The fine paper industry, notwithstanding the great financial losses it sustained, made significant advances in policy and in practice during the year 1921. Side by side with the liquidation of inventories there progressed a moral liquidation; the opportunist motive was very definitely subordinated to the business-building principle of service; the idea of giving a dollar's worth of value for a hundred cents' worth of cash reestablished itself in the commodity market and gained great headway in the labor market.

These generalizations find outward expression in:

The improved standards of technical and commercial excellence throughout the fine paper industry;

In the truly marvelous progress that has been made in the standardizaation of grades and values;

In the reduction of the number of meaningless and confusing watermarks, brands and trade names indiscriminately applied to papers heretofore unstandardized and unclassified;

In the clear statement of merchandising policies, both of mills and of merchants, and the more conscientious adherence to policies by all concerned;

In the establishment of closer co-operative selling arrangements between the mills and their distributors and between the co-agents of the mills in their competitive relations with one another; and

In the more definite recognition by all the members of the industry that there is a bond of common interest unitig the fine paper manufacturer, the merchant, the printer and the consuming public.

The Mill, the Merchant and the Printer

Linking the mill with the printer stands the wholesale paper merchant. Uniting the paper merchant with the consuming public stands the printer, the creator and the final distributor of all the business of the fine paper mill. His customer, the consuming public, knows little and cares less about sulphite, thirds and blues, animal sizing and loft drying, but only about letter heads, factory forms and like commodities that, from his point of view, are the products of the printing press. Mills and merchants during the past twelve months have recognized as never before the economic function of the printer as the necessary and logical retail distributor of their product and with this growing recognition has come a corresponding realization of their obligations to the printer as the third member of their great partnership. Mill and printer alike recognize that the wholesale paper merchant is an economic necessity to both of them. This recognition carries with it the obligation, binding equally upon the printer and the mill, to conform their policies, the one as buyer and the other as seller, to the economic scheme that makes the merchant necessary.

No paper mill that makes a practice of selling its product direct to the jobber's customer (the printer), and no printer who buys direct from the mill those items that should pass through the channels of normal wholesale distribution, comes into court with clean hands when the commercial ethics of the wholesale paper merchant are under investigation. No merchant whose policies are unfair to his mill connections or detrimental to the interests of the printing industry is qualified to pass judgment upon the selling methods of the former or the buying habits of the latter.

The developments of the past year have forced the recognition of these truths upon the consciousness of the industry. Is it too much to hope that the year 1922 will witness the development of a finer and more pervading sense of the mutual rights and obligations of the three factors essential to the production and distribution of fine papers in their relations to one another and to the public?

SUTHERLAND PAPER CO. TO ISSUE STOCK

The Sutherland Paper Company, Kalamazoo, Mich., will issue $150,000 of 7 per cent convertible preferred stock and Olmsted & Mulhall have been authorized to handle the unsold portion, and announce it will be offered the investing public as soon as official notice of its authorization by the Michigan Securities Commission is received.

When the issue was originally proposed, the directors of the company immediately subscribed for $60,000 worth, leaving $90,000 for the general public.

The financial history of the Sutherland Paper Company makes this preferred issue a particularly attractive investment. Since 1917, the year established, the Sutherland Paper Company has never been forced to report a loss. Total dividends of $175,000 have been paid on a capital averaging less than $350,000. It is true that the 1921 common dividend was materially reduced, but that was done to conserve working capital.

The erection of the new paper mill required $150,000 in excess of the originally estimated cost and it is to make good this amount in the working capital needed for the business that the present preferred issue is being offered.

CONTINENTAL PAPER & BAG MILLS

We Manufacture 400 Tons Daily of the Following Products Selling Only to the Jobbing Trade

Grocer's Bags
Paper Sacks
Millinery Bags
Glassine Bags
Carton Liners
Paper Bag Specialties

Wrapping Papers—
Manila, Fibre and Kraft
Tissue Papers
Toilet Papers
Paper Towels
Paper Napkins

Counter, Catalog and Phonograph Record Envelopes
Continental Safety Egg Cartons

WAREHOUSES

Atlanta
Baltimore
Cleveland
Chicago
Cincinnati
Detroit
Hartford
Houston
Indianapolis
Minneapolis
New Orleans
Syracuse
New York City
St. Louis

AGENTS

W. H. Claflin & Co., Inc., Boston, Mass.
F. E. Fowler Co., New Haven, Conn.
Huff Paper Company, Philadelphia, Pa.
Huff, Barnes & Opie, Inc., Pittsburgh, Pa.
Johnson, Carvel & Murphy, Los Angeles, Cal.
Johnson-Lieber Co., Boise, Idaho.
Johnson-Lieber Co., Portland, Oregon.
Johnson-Lieber Co., Spokane, Wash.
Johnson-Lieber Merc. Co., Tacoma, Wash.
Johnson-Lieber Merc. Co., Seattle, Wash.
Johnson-Locke Merc. Co., Salt Lake City, Utah.
Johnson-Locke Merc. Co., San Francisco, Cal.
Memphis Paper Co., Memphis, Tenn.
C. H. Robinson Co., Portland, Maine.
Texas Paper Co., Dallas, Texas.

MILLS AND FACTORIES

Brooklyn, N. Y.
Watertown, N. Y.
Cincinnati, Ohio.
York Haven, Pa.
Ashland, N. H.
Menominee, Mich.
Greenwich, N. Y.
Rumford, Maine.
Marinette, Wis.
Oconto Falls, Wis.
Ottawa, Canada.

Samples on Request

A GIGANTIC PRINTING PLANT—PRINTING DONE IN ONE, TWO OR THREE COLORS

The Year in the Coarse Paper Trade

Depression Which Started in June, 1920, Reached Its Low Point in January of Last Year and the Situation Has Improved Since That Time, Although Conditions Are Still Far From Normal—Prices Still Double Pre-War Levels and Until Further Liquidation Takes Place There Will Be Lack of Confidence in Business—Should Not Sacrifice Quality to Price—Great Need for Association Work.

Written Especially for the Annual Number by John Marshall, Vice-Pres. Louisville Paper Co., Louisville, Ky.

A review of the past year of the paper business surely will make unanimous the opinion that "The best thing about 1921 is that it is past" and if an epitaph would be written of that year, the above phrase would be sufficient.

That year marked the turning of the tide toward normal conditions in the reconstruction that followed the World War.

It should be gratifying to feel how successfully we have met the situation of that period and face with confidence the problems that still confront us. The great problem is—to forecast just when the full effect of reconstruction will be felt, so as to make reasonably certain complete return to normal conditions.

Further Adjustments Inevitable

I am sure that most of us in the paper business will agree that further adjustments are inevitable and the past year has only brought us nearer the ultimate goal. Surely we are finished with the sensation of the violent market declines of the past year.

The producing capacity of the mills exceeds the demand and until that is absorbed we will not get to a solid foundation. Fifty-three new paper machines have been put in operation during the last eighteen months, yet the total production was 27 per cent less than in 1920. So we are now facing a situation where capacity and cost of production have been increased to take care of a much larger volume of business than can be secured, with the result, of a period of fierce competition and t e mill, or merchant should be prepared to meet this condition by reducing the operating cost to the greatest extent possible and increase at the same time, volum of business. If this is done, they will be in a position to take advantage of every opportunity.

Dun and Bradstreet's report for the year of 1921 show more failures than for the past six years, December being the heaviest. Will 1922 show a better record? Statistics show that 80 per cent of the people who enter business fail, yet no one enters a business except with the intention to succeed.

Lack of Knowledge the Worst Competitor

To exist, a business must make money. In other words, dispose of its product for more than it cost. To insure a profit therefore, one must know the cost of operation. There is a limit between profit and loss and a proper cost system will define that line—will eliminate guess.

The worst competition is from those who lack the knowledge as to cost of doing business. To educate them therefore is very essential to the welfare of all of us. It is a poor merchant who will continue to sell a line that his cost system proves is a losing one. He will either discontinue it or put it on a correct basis.

A problem of the large merchant is the existence of a number of small merchants who lack knowledge of correct cost. There are ways for him to meet that situation, preferably by educating him to secure a reasonable profit, or having the good sense to see that every sale made shows a profit and to turn down all business that does not. The small competitor will soon elevate his price or cease to be in business.

Honest Competition Stimulates Trade

It is a mistake to fight a competitor; nothing permanent is gained by fighting. Competition stimulates your trade and keeps you from slumping. Beat your competitor if you can, but by selling better merchandise, giving better service but never by starting a price war. That is sure destruction for your competitor and for you. Keep your margin of profit on a proper basis and you will win out in the long run.

Accurate information regarding the various elements which go to make up cost, as contained in cost records, eliminate arbitrary or guess cost, which one without such a system must necessarily use. A cost system, like an X-ray picture, brings to light wrong conditions and will suggest a remedy.

We do not want to get in the class of the Southern grocer, who sold 30 per cent of his product below cost, 50 per cent without profit and all of this because he did not know his cost of overhead and the actual expenses to which he was being subjected in carrying certain lines.

Value of Associations

To me it seems that we need in the paper business, greater effort on the part of all to back up the National Association in their effort to educate our members on the advantages of knowing their cost.

Right at this time, I would like to say a word on the value of our trade associations.

We will face for several years, more or less uncertain conditions—conditions upon which we must build securely and firmly. Through our paper associations, we have the opportunity to study facts as they are, and the co-operation of an organization of individuals interested in a common cause, is the best educational factor in bringing our individual business to a more profitable basis.

Our associations have done great work, but they need and should have, the fullest co-operation of us as individuals. Primarily, we are interested in association work because we believe that through its work, we can better our own business.

Association work promotes fairness, intelligence and confidence in its members, but remember that "a chain is only as strong as its weakest link," and contribute to your association if you would receive from it. The association's need and should have the loyal support of the entire industry.

I shall not attempt to give any statistics for most of us are receiving daily, through our associations, far more statistical information than we can digest, and our trade journals give us each week, the resume of conditions of the entire industry.

Some Improvement

The depression in the coarse paper business, which started in June, 1920, reached its low point in January of last year, and on the whole, prices have improved to this time, but are still very

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Logan, Swift & Brigham Envelope Co.	Worcester, Mass.
United States Envelope Co.	Holyoke, Mass.
White, Corbin & Co.	Rockville, Conn.
Plimpton Mfg. Co.	Hartford, Conn.
Morgan Envelope Co.	Springfield, Mass.
National Envelope Co.	Waukegan, Ill.
Morgan Stationery Co.	Springfield, Mass.
P. P. Kellogg & Co.	Springfield, Mass.
Whitcomb Envelope Co.	Worcester, Mass.
W. H. Hill Envelope Co.	Worcester, Mass.
Morgan Tissue Co.	Springfield, Mass.
Pacific Coast Envelope Co.	San Francisco, Cal.
Central States Envelope Co.	Indianapolis, Ind.
Logan Drinking Cup Co.	Worcester, Mass.

much under normal. Prices are still double the pre-war levels and until further liquidation takes place, resulting from lower cost of production or increased demand for production, there will be a lack of confidence in the business.

This readjustment is taking place and as it does, buying will increase and gradually start flowing in its accustomed channels.

There is a very strong tendency at this time, to sacrifice quality to attain low prices. Every effort should be made to curb this condition. As an illustration, we may take dry finish butchers' fiber. For a standard, let us take a sheet containing 70 per cent sulphite, 30 per cent ground wood. I feel safe in stating that on the market today, will be found papers that have just the reverse percentages. Such merchandise does not give satisfactory results, does not increase the demand and only serves to demoralize the situation. The consuming trade want lower prices of course, but they do not want unsatisfactory quality at any price. Let us strive to maintain our standards of quality and not be stampeded into stocking up on "junk" to meet the situation. So putting more talk on quality and less on price, will render a real service to our customers.

Should Create New Use for Paper

Another suggestion to the manufacturers and merchants, would be to create new usages for paper, thereby improving the volume in addition to opening an avenue to absorb the present over supply of production facilities.

Babson, the statistician, has predicted that "business cannot as a whole hope for prosperity before 1924." But every year has its opportunity, though they must be sought for with diligence. Any profits made out of the paper business this year, will be made from efficient management, rather than from our speculative opportunities.

In conclusion, I feel that further readjustments will follow, but that with reasonable optimism and strong constructive effort, the coarse paper industry will see this year wind up with far better results than now are visible.

PULPWOOD CONVEYOR OF DETROIT PAPER CO.

An approved pulpwood conveyor, a gigantic structure of steel and crete, has been added to the plant of the Detroit Pulp, Sulphite and Paper Company, Detroit, Mich., and is now in regular use. According to officials of the company the equipment has worked very satisfactorily and has reduced the wood handling cost in the yard materially, as well as eliminated an enormous amount of space taken up under the old system in piling the wood in the yards.

The conveyor is the cable and bucket type, carried on a heavy steep trestle work, supported by concrete towers, with a span of 1,000 feet between the outside towers and an elevation of 90 feet.

The wood is handled from the track by large steam cranes, taken from the boats and dumped onto a platform that slopes toward No. 2 conveyor, which is of the chain type. The wood goes down into this conveyor and is carried to three sets of bandsaws in the slasher house, which is shown to the extreme in the illustration. Here the wood is cut into two-foot lengths and taken onto the main conveyor and dumped into piles. The cables and buckets return underground in a concrete trough.

By examining the illustration, this return conveyor may be seen rising up from the ground, and dropping the wood on the No. 4 conveyor as it is needed in the wood room.

No. 4 conveyor takes the wood into the barking drums.

This conveyor will handle 50 to 60 cords of wood an hour under normal conditions. The wood piles are thoroughly protected by sprinklers from possible fire loss.

The equipment is in every way modern and one of the most satisfactory now in use in the United States.

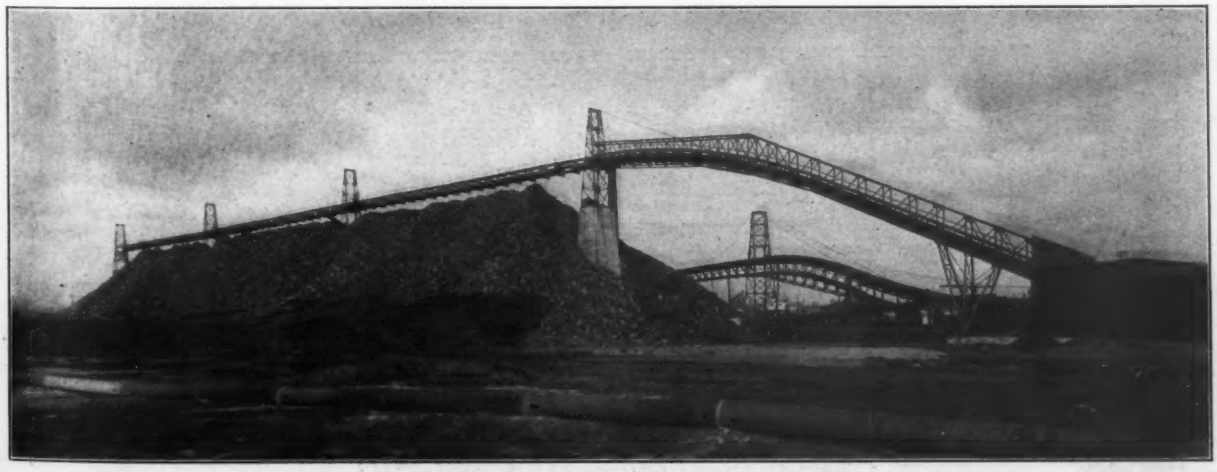
HARTONG-MANNING PAPER CO. FORMED

The Hartong-Manning Paper Company has been organized to carry on business at 75-79 South Chambers street, Galesburg, Ill.

The new concern, which will be incorporated under the laws of the state, will carry job paper and specialties. The business will be conducted on a wholesale basis. The local office will become the center of a valuable territory into which traveling salesmen will be sent. It is thought that the stock will be arranged so that the company will be able to start business on or about May 1.

At present the building is being remodeled under the direction of F. W. Hartong, who is president of the company. Changes are being made in the structure which will make it adaptable to the wholesale paper and specialty business.

F. W. Hartong, president of the concern, was for many years engaged in the wholesale grocery business. He comes to this city from Streator. P. A. Manning, secretary, resides in Waterloo, Ia.



New Pulpwood Conveyor of the Detroit Pulp, Sulphite and Paper Co. Detroit, Mich.

John Aspegren, *President* J. A. Millar, *Gen. Mgr.* B. Lindell, *Treasurer*

KRAFT PULP SULPHITE

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Manufacturers of:-

L S — Castle Brand Unbleached Sulphite

STÖMNE — Extra Strong Kraft

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Sulfit IA Stora — Unbleached Sulphite

D Stora Kraft — "Red D" Kraft

UDDEHOLM:

USI △△△ — Bleached Sulphite

UHB K — Strong Kraft

UHB B★★ — Easy Bleaching Sulphite

UHB N — Bleachable Sulphate

LION BRAND:
Manufactured by WERMBOHL SULFATFABRIK

WF AB A — Easy Bleaching Sulphate

WF AB O — Bleachable Sulphate

WF AB 01 — Kraft

SCANDINAVIAN-AMERICAN TRADING CO.

50 East 42nd Street
New York City
Telephones: Murray Hill 8311-12-13

Not a Prosperous Year in Wood Pulp

Considerably Less Tonnage Was Produced in 1921 Than Previously Due to Decreased Demand and Critical Requirements on the Part of Consuming Interests — Business Unsteady and Orders Usually Were Secured Only at Considerable Reduction in Price—Contract Prices for All Varieties of Pulp from January to December Show Interesting Fluctuation—Hull Fiber Pulp More Extensively Used

Written Especially for the Annual Number of the Paper Trade Journal by O. F. Swanson, Manager of Sales Pulp and Paper Trading Co. and J. Andersen & Co., New York

In reviewing the wood pulp industry of 1921 one also comes in contact with its kindred industries, and it is exceedingly interesting to note the great developments made in the way of facilitating and economizing in the manufacturing as well as in the direction of creating new and greater fields for the already enormous output of products in which wood pulp constitutes the fundamental ingredients.

Among the quite recent and prominent features in this respect is the rapid growth of the carton and paper container business, but the moulding and compressing of wood pulp into various forms from the smallest trinkets to large articles is also today an established industry on broad proportions and its products have in an appreciable measure contributed to the growth and success of the wood pulp business, but the paper and board mills are still its staunchest friends and the next paragraph will explain why.

Production in the United States

With the exception of a small percentage of paper and board, possibly not over 10 per cent, the remaining 90 per cent of these commodities are either partially or entirely made of wood pulp, and according to the estimated capacity production of the world of paper and board in 1919, 15,030,000 short tons comprise the entire tonnage of which 8,370,000 is credited to the more than 800 paper and board mills in the United States, which is a trifle more than one-half of the world's production.

During the same year the estimated wood pulp production of the United States in tons of 2,000 pounds each is as follows:

Mechanical	Sulphite	Sulphate	Soda
1,450,000	1,385,000	162,000	377,000

as compared with seven and one-third million tons of paper and board for 1920 and the estimated gross tonnage of pulp:

Mechanical	Sulphite	Sulphate	Soda
1,578,000	1,576,000	212,000	432,000

and five and one-quarter million tons of paper and board for 1921 and the estimated gross tonnage of pulp:

Mechanical	Total Chemical
1,250,000	1,500,000

This shows a decrease of about 37 per cent in the tonnage of paper and board manufactured in 1921 compared with the tonnage of 1919 and a decrease of pulp of about 19 per cent.

The balance of chemical pulp required, approximately 375,000 tons, was imported from Canada, Sweden, Norway, Finland, Germany, Austria Hungary—or the various countries formerly included in Austria-Hungary—and a very small percentage from Japan. The first four of the countries named are especially interested in the wood pulp industry which is well established there, owing to their great resources of the most essential raw material for this product namely, a fine grade of spruce pulpwood.

Reasons for Decreased Production

One of the important reasons for the decreased production of wood pulp particularly in the United States during 1920 and 1921 can probably be attributed to the vigorous demand of the trade for improvement in quality, which question is also of vital importance today, as well as for the future time of peace unless some cause of which we have no knowledge now should change it. But the greatest cause for the decreased tonnage was no doubt due to the inability of the paper and board mills to operate to capacity owing to insufficient orders for the finished product. The comparatively large stocks on hand of various grades of pulp at the majority of the mills, both consuming and producing, was also an important factor.

More Attention Paid to Quality

If the past year did not bring much in the way of financial success for the wood pulp manufacturers, it certainly made up for it as a booster for quality of their product, and it was especially severe on bleached sulphite and Kraft pulp intended for the use in the manufacture of first quality papers, where cleanliness, good color and strength are the most important features.

As a consequence, particular attention was paid to this very important question and great efforts were made to accomplish everything within reason demanded by the trade with the view of obtaining satisfactory results in this respect and careful technique and skill became of utmost importance.

Influence of Business in General

Taking into consideration that board, news print, wrapping and book paper are estimated at approximately 82 per cent of the total production in the United States of the finished products for which wood pulp is the chief raw material, the tremendous importance of this commodity is easily recognized together with the vast possibilities for further expansion of the wood pulp business. However, judging from unmistakable signs or symptoms during the past few years, and particularly in 1921, it is quite evident that the increased size of the wood pulp industry resulted in its greater susceptibility to the influence of business in general as well as to market fluctuations in other raw materials, such as unbleached and bleached hull fiber pulp, rags, old rope, cotton linters, waste-paper or any fibrous material used in papermaking. The hull fiber pulp is the most recent of important raw materials for paper-making and a further space will be devoted to it at the conclusion of this article.

The Price Movement

The price movement in almost all grades of pulp, whether foreign or domestic, during 1921 was exceedingly illusive and, with a few exceptions, prospective business of any consequence was very scarce and evasive, and as a rule could only be secured through personal contact and at a substantial reduction in price, Quite a few firms, however, had fixed prices either for 30, 60 or 90 days, by which they probably sacrificed considerable business for the sake of principle.

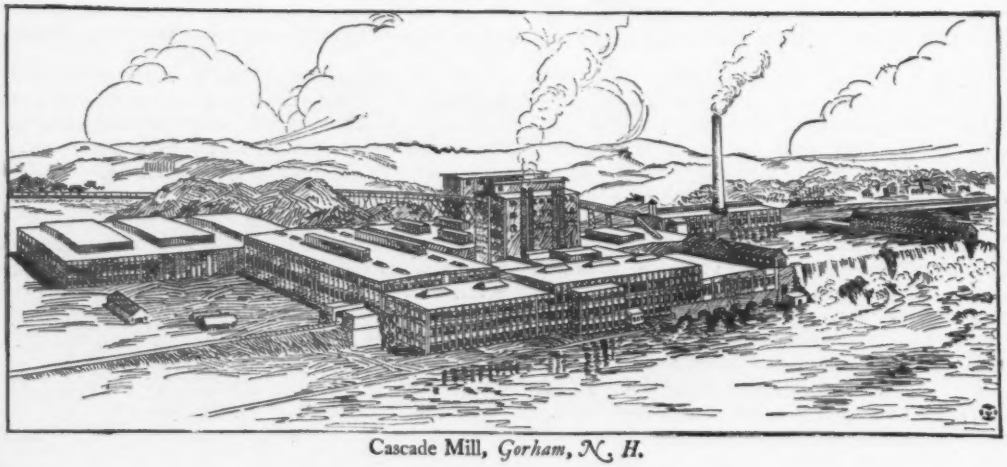
The inactivity in the paper market, the large stocks of pulp

BROWN COMPANY

founded 1852

PORTLAND, MAINE

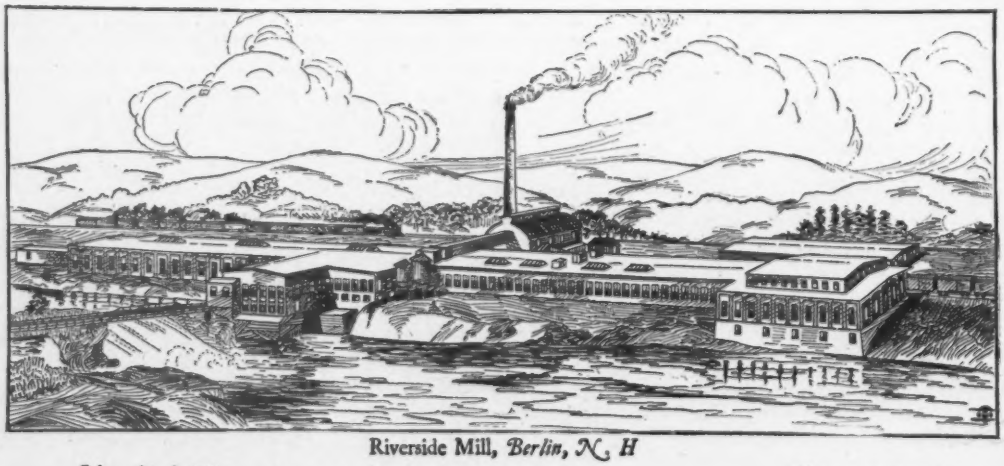
Paper Sales Division



Cascade Mill, *Gorham, N. H.*

Manufacturers of

Nibroc Kraft	Nibroc Kraft Towels	Waxo Kraft
Nibroc Bond	Papeterie	Paper Specialties
BERMICO Sheathing Paper	White Waxo	BERMICO Mill Wrappers
Padiv Lining Paper		Paper Tubes



Riverside Mill, *Berlin, N. H*

New York Office:
Woolworth Building

Chicago Office:
110 So. Dearborn St.

on hand at the paper mills on this side and at the pulp mills and ports abroad, together with the apparent anxiety of the owners or firms controlling the stored pulp to convert it into cash as speedily as possible, resulted in bidding for business with apparently little, if any, regard for the actual costs of the goods involved. As a consequence, a sharp break in prices occurred in all grades of pulp during the first quarter of the year followed by continued reduction in prices during the second and third quarters, but during the last quarter the market became somewhat firmer and somewhat improved prices were obtained for the better grades of pulp.

It also caused the curtailment of the production of pulp, both on this side and abroad, and a large number of pulp mills were obliged to close down for lack of business at quite frequent intervals throughout the year. It is reported that in many cases the sales prices were considerably below the actual cost prices of the pulp, although the cost was based on correct replacement values of the various raw materials used in the manufacture of wood pulp.

Estimated Contract Prices

Owing to the reasons previously referred to and the great fluctuation in prices covering actual sales, it is almost impossible to arrive at what might be considered fairly accurate average prices on the various grades of pulp for any month during the whole year, but the following estimated monthly contract prices per ton of air dry weight, f. o. b. pulp mills for mechanical wood pulp in the United States and Canada and per pound for domestic chemical pulp and ex-dock usual Atlantic ports on imported pulp should be sufficiently close to the actual prices at which business was transacted to give a fair description of the market conditions. However, any prices given in this article are more or less nominal due to the unusual conditions in the trade throughout the year. Estimated average monthly pulp prices American and Canadian:

F. O. B. PULP MILL

	January	February	March	April	May	June	July	August	September	October	November	December
Bleached sulphite..	8 @9c	6½@7c	6½@7c	5½@6c	5½@6c	5½@6c	5 @5½c	4 @4½c	4 @4½c	4 @4¼c	4 @4½c	5 @5¼c
Easy Bleaching.....	7 @8c	5¼@6c	5 @5½c	4½@4¾c	4½@4¾c	4 @4½c	3¾@4c	3 @3¼c	3¼@3½c	3 @3¼c	3¼@3½c	3¼@3½c
Strong unbleached..	6 @7c	5 @6c	4½@5c	4 @4¼c	4 @4¼c	3¾@4c	3½@3¾c	2¾@3c	3 @3¼c	2¾@3c	2¾@3c	2¾@3c
News sulphite.....	5½@6½c	4¼@5¼c	4½@4¾c	3 @3½c	3¼@3¾c	3¾@3¾c	3 @3¼c	2½@2¾c	2¾@3c	2½@2¾c	2½@2¾c	2½@2¾c
Soda (bleached)....	8 @9c	...@8c	...@8c	5¾@6c	5¾@6c	5 @5½c	4¼@4½c	4¼@4½c	...@4c	4 @4¼c	4 @4¼c	4 @4¼c
Kraft	5 @6c	4¾@5¼c	4½@5c	3½@3¾c	3½@3¾c	3¼@3½c	3 @3¼c	2½@2¾c	2¾@3c	2¾@3c	2¾@3c	...@3c
Groundwood ,.....	$70@$80	$55@$65	$50@$60	$30@$35	$30@$35	$30@...	$28@$30	$28@$30	$30@$35	$30@$35	$30@$35	$28@$30

ESTIMATED MONTHLY PRICES IMPORTED PULP

	January	February	March	April	May	June	July	August	September	October	November	December
Bleached sulphite..	8 @9c	6½@7c	6½@7c	6 @6½c	6 @6½c	6 @6½c	5¼@5¾c	4½@4¾c	4 @4¼c	4 @4¼c	4 @4¼c	4¼@4½c
Easy Bleaching....	7 @8c	5½@6c	5½@6c	5 @5¼c	4¾@5 c	4½@4¾c	4½@4¾c	3½@3½c	3¼@3½c	3 @3¼c	3 @3¼c	3¼@3½c
Prime strong unbl'd	6½@7c	5 @6c	5 @6c	4½@5c	4½@4½c	4 @4½c	3¾@4 c	3 @3¼c	3 @3¼c	2½@2¾c	2¾@3c	2¾@3c
Kraft	5 @6c	5 @5½c	4¼@5c	3½@3¾c	3½@3¾c	3½@3¾c	3 @3½c	2½@2¾c	2½@2¾c	2¾@3c	2¾@3c	2¾@3c

Not a Profitable Business in 1921

Comparing the above prices with pre-war prices, it would probably appear to any one not familiar with the wood pulp business that it should have been profitable during 1921, but the increases in prices of pulp were more than offset by the relatively higher costs of manufacture, higher wages paid at pulp mills, increased freight rates and price of raw materials, and the war boom slogan of "how much profit should be made" was changed to "how low can we go and keep a goin'."

If also the rather modest profits in wood pulp during ordinary times are taken into consideration, it is reasonable to assume that the only pulp mills which did not operate at a heavy loss during 1921 were those fortunate enough to own their own timber, and the only mills in a still better position, were probably those located in countries where the tremendously increased value of the American dollar, due to the depreciation of their own currency, was a very important factor.

Hull Fiber Pulp

During the last year, the hull fiber pulp, or as frequently referred to as cotton linter pulp, was used quite extensively in many grades of paper. The opinion of the trade regarding its value as raw material for paper making varied considerably and it was only after a series of experimental runs in a number of paper mills, that its true value and classification was established. To begin with, it was in many cases considered as a suitable substitute for bleached soda pulp. This, however, was not the case, as it was proven conclusively an excellent substitute for certain rag fibers and as such, successfully used with rag stock or other raw materials in better grades of paper. The prices on bleached hull fiber pulp varied from approximately 7½ to 4¼ cents per pound, but during the last quarter of the year, the average price of the first quality was about 5¼ cents per pound delivered at the paper mills.

Expansions Stimulated by Prosperity

The prosperous period enjoyed by the paper mills on account of the demand stimulated and in many cases created by the war had been taken advantage of by many mills to rehabilitate their plants and bring them to a degree of efficiency enabling them to manufacure more economically than before. Unfortunately, however, in a number of instances the depression and readjustment due to the cessation of the war found many of the paper mills unprepared for the thorough readjustment which has been taking place. The prosperity enjoyed during the war and for a short time thereafter was looked upon by many manufacturers as a permanent feature of the paper trade and their plans for expansion and addition to their plants was based upon this theory with most disastrous results.

Many of the larger paper manufacturers who had enjoyed liberal bank balances and easy finances found themselves, due to the changed business conditions, suddenly in a position where they had to develop a budget system of financing with the result that it was found that the disbursements far exceeded receipts. This situation has been rendered more acute by the continued depression and has necessitated the flotation of large bond issues by many of the paper mills in order to place themselves in a situation financially to enable them to fund a large part of their current indebtedness, some of which had been incurred for purposes of expansion, payment of which it had been hoped to make from current profits. These bond issues have been floated by concerns in various lines of the paper industry, principally, however, news mills, board mills and bag mills. The necessity for this financing illustrates the class of mills which were most prosperous during the war and which expanded and increased their production most noticeably.

The pulp and paper manufacturers have now finally realized that the war prosperity has terminated and that from now on they may anticipate close competition and are satisfied with normal profits which were considered as totally inadequate to the period of inflation through which their mills with other industries have passed.

In view of the fact that the United States is the largest producer of paper products, it is also the largest consumer of wood pulp, but owing to its rather limited supply of available pulpwood suitable for the better grades of pulp, the cost is apt to advance as sources of supply diminish resulting in the possible increased importation of wood pulp from Canada and Europe.

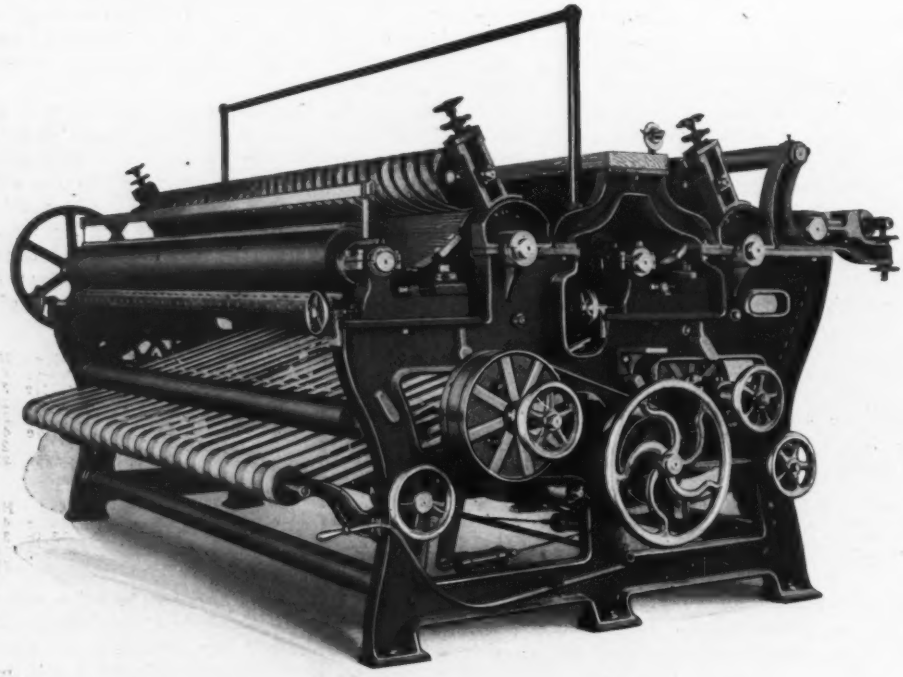
KAUFMAN PAPER CO. FORMED AT BURLINGTON

The Kaufman Paper Company has been organized at Burlington, Vt., for the purpose of trading in coarse papers, paper bags, etc.

DILLON MACHINE CO.

Lawrence, Mass.

Paper Mill Machinery



THE DILLON DUPLEX PAPER CUTTER

"THE last word in accuracy." This is what users say of our new improved DUPLEX PAPER CUTTER. The reason is that the length of sheet is regulated by our *Expansion Pulley* and *Telescope Indicator.* With this arrangement, too, the length of sheet can be changed very quickly. No waste of *time;* no waste of *paper.*

BUILT FOR STRENGTH—DURABILITY—ACCURACY

Rags and Paper Stock Have Depressing Year

Although Depression Started in 1920, It Carried Along Well Into 1921—Occasional Spurts Took Place But They Were Short Lived—Prices Reached Lowest Level Since 1915 and Were So Low at Times That They Did Not Pay for the Cost of Collecting—Low Prices in Cotton Linters and the European Situation Among the Factors Which Raised Havoc with the Market — Some Improvement Now.

Written Especially for the Annual Number by Walter R. Hicks of Daniel M. Hicks, Inc.

Have you ever in the heyday of your youth visited Coney Island? Did you ever pull up in front of a gallery labeled "Hit the Baby and Get a Good Cigar"? Did you ever accept the challenge of the barking proprietor and try out your wing and eye? If so, I will venture to say you did not hit any of the "Babies" at all, or if you did hit any, it was not the one you aimed at. So it is with the market of last year. There were many reasons why we did not enjoy brisk business over that period. We may single them out, but the chances are we won't hit the right one. I will leave it to my "dear reader" to wrap himself in thought and rap his own reasons on the head. It is not my purpose to bean any theories or to knock over any hunches. I will, however, try to set forth the movements, manœuvres and reconnoitering that characterized the market of 1921. It is my job, however, to tell what happened, and not why it happened, and should I cut in with my own impressions of the conditions that influenced the situation, I ask your humble pardon.

Recovery Slow But Certain

A bald head is the sign of a busy street. A grass-grown, track-rusted siding does not indicate a busy thoroughfare. It is a long stream that has no paper mill and a longer track that has no mill siding. But no matter where the paper mill may be, whether in the industrial centers of our great and glorious country or in the more sparsely settled sections, this tell-tale blade of grass is waving its distress signal, and the once gleaming rails, now pockmarked with rust, tell the story of decaying prosperity. Not so with the little cinder path that leads up to the office. This little path presents the bareness of baldness worn smooth with the frequent tramping back and forth of the many salesmen who trudged their weary way with full sample kits and empty order books. This deplorable state of affairs did not only exist in the paper trade, but was general. All industries shared in the inactivity of a subnormal period resulting from a prolonged abnormal one. Recovery is slow but certain.

Survival of the Fittest

It has been a case of the survival of the fittest. Reaction was looked for after the great flood of business, known as the "War Boom," but which carried way beyond the war and actually did not set in until after the armistice. It was only the "War Babies" that thought there was no hereafter. The well established calculating business man realized a slump was inevitable; that somebody must "pay the piper" for the tremendous expenditures and wild extravagances that took place during and after the war. The ebb was like a tidal wave and swept all before it with the relentlessness of doom. Many a good old craft ran aground and the more unfortunate were left hopelessly high and dry. There is always the flood again to set things afloat, but the slack water has been so prolonged and the incoming tide so slow in the making up, that many a staunch old ship had to use every precaution to keep afloat and the frailer craft have either pounded to pieces on a reef or have gone to wrack and ruin on the beach. Although the depression started in 1920, it carried well into 1921. Banks were filled up with collateral on which they had loaned money, and this collateral was mostly warehouse receipts. Their value had depreciated to such a degree that forced sales resulted in turning them into cash. Not only the banks found it necessary to realize money by these sales but private corporations also were driven to make great sacrifices to raise money. Storage space was still at a premium which further tended to dumping stock on the market that could be picked up at almost any price, until values were reached that were below pre-war levels.

Unsteadying Influences

With these unsteadying influences hovering over the market, inactivity prevailed. A tariff was enacted that was intended to protect American valuation and regulations made to prevent "dumping" into the American market, but the very low rates of foreign exchange favored the American buyer and the effort to control the situation went askew. Both raw and finished material (foreign material) swamped the country at prices that were below the cost of production here and this played havoc with prices. High freight rates resulted in isolating territories, and markets that were always at our back door were shut off, as they were no longer accessible, and this permitted local consumers to buy at their own figure. What the mills gained by what seemed to be attractive purchases was offset by the prices they were forced to meet on finished material, because of the foreign competition. Values reached the point where rags and waste paper were below the cost of production and this naturally discouraged collection. Had the mills not bought from hand to mouth, there would have been sharp advances, as any sort of demand would have found a rather scant supply. On the other hand there were a few bright spots on the horizon. Practically all grades had thoroughly liquidated; wages were forced down to a point that would permit of manufacturing at a profit, and a steady advancing foreign money market gave promise of better times ahead.

Short Lived Spurts

Occasional spurts characterized the market, but they were short-lived. Business was champing at the bit, as it were, waiting for the signal to get away, impatient and sensitive to the slightest influence. After every sharp advance there was reaction, and after every decline there was a tendency to stiffen up. The situation was fickle. It was as void of backbone as a chocolate eclair in summer. Just as things would begin to look good and everybody became hopeful, there would be a sudden easing off. The situation is best described by the Irishman's first impression of a frog. As he gazed at the little creature, he remarked: "Look at him; when he stands up he sits down, and when he walks he jumps." And so it was over 1921. All theories were blasted.

There were more buyers at $1.20 on roofing rags, which was the average high of last year, than there were at 50 cents, the lowest figure realized during the year. There were more tempted to buy

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books at $1.50 than there were at 65 cents; soft white shavings and hard white at 3¼ cents and 4¼ cents than there were at 2 cents and 3¼ cents (respectively) per pound; mixed papers at 55 cents per 100 pounds were being scrambled after while at 25 cents per 100 pounds they went begging. Had the mills laid in a fair reserve of low priced material, and then bought from hand to mouth, these sudden spurts would have been thwarted and the market would have kept a more even keel. The great decline in prices that took place in 1920 carried over into 1921 and reached the lowest seen since 1915. These low figures were reached along about spring and lasted pretty well through the summer. There was no real stiffening until September, and then the market took on the aspect of good business. This was maintained until November, and then things reacted slightly. There was a slight easing off until the end of January, at which time there was another turn of affairs for the better which is still in force.

First Sign of Real Improvement

To go back to the advance of last September. This was the first sign of real improvement, and to further demonstrate how sensitive the market was, particularly to demand, we will review a few prices. The down grade did not terminate until pre-war levels were reached. It had its beginning in October, 1920, and lasted about one year. Shirt cuttings went from 28 cents to 8 cents per pound; No. 1 old whites went from 18 cents to 5½ cents per pound; hard white shavings from 11 cents to 3¼ cents per pound, and so on. These few grades will illustrate about how great the decline was. On the other hand as soon as a demand sprang up, it responded sharply, and from September to the end of October, prices advanced from 25 per cent on the high grades to over 100 per cent on the low grades. Shirt cuttings advanced from 8 cents to 11 cents; old whites from 5½ cents to 7 cents; hard white from 3¼ cents to 4¼ cents; books from 65 cents to $1.50; mixed papers from 25 cents to 55 cents, and roofing from 50 cents to $1.20. These sudden advances in prices serve to show, in the opinions of many, that there is not the supply to draw on, which further demonstrates that any steady business will mean steadily advancing prices.

Low-Priced Linters Raise Havoc

Low-priced linters raised havoc with the rag market. When things took a turn downward, as we all know, there were thousands of tons of government munition linters on hand fit for no other purpose than papermaking. These linters were dumped on the market, and roofing mills, fiber mills, and even some high-grade mills took on quantities of linters to use in conjunction with rags. These linters went as low as 75 cents per 100 pounds f. o. b. South. Now with the short crop in 1921, linters advanced until they have reached 3 to 3¼ cents per pound f. o. b. the South, and still remain stationary around that figure. When linters could be had for 75 cents, South, roofing was in the neighborhood of 3½ cents per pound; but when linters reached 3¼ cents per pound, roofing rags were 50 cents per 100 pounds, and these paper mills naturally had to abandon linters and go back to all rag. Practically the only mills that can pay the price for linters today are the high-grade mills, but they are more inclined to use bleached linter pulp prepared especially for papermaking. The use of linters now is, therefore, confined to the better class of mills and would only affect old white rags and new cuttings. Linters, although still somewhat in the experimental state, are a factor in papermaking, and are here to stay.

The European Situation

The European situation was such that it favored heavy importations to this country of all grades with the exception of waste paper. This was felt more in the early part of 1921, but since early summer, home consumption abroad improved as conditions grew better, and this, together with advancing exchange, checked the influx of foreign stock. When roofing rags got to one cent per pound the mills were still in their lethargy, and many importers, figuring this a good buy, brought in large tonnages. The same was true of other grades in a lesser degree. When this stock came in, business was still quiet and rather than store rags, the stock was unloaded at whatever prices could be realized and many bargains were available. German blues, mixed prints, dark prints, fustians and No. 5 old whites all went to roofing mills. This, of course, reflected on the domestic market, and will eventually tell on other grades, as it took rags out of their proper channels. This stock would otherwise hang over the market and be available for the better mills when they are again buying.

Another feature that discouraged the gathering of old bags is the woolen rag situation. Woolens have been a drug on the market, and as their source is mixed rags, the source also of all cotton rags, they were scantily collected. Had woolens been in good demand, there would have been further depression in old cotton rags.

Conditions Could Not Have Been Worse

Although it is fair to assume that conditions could not have been worse, and that prices reached the lowest point possible, it was only the low grades that went to pre-war levels, as the higher grades kept well over figures that prevailed before the war. No. 1 white shirt cuttings, for example, in the dullest period, only went to 8 cents per pound, whereas the pre-war price was about 5 cents per pound, No. 1 old whites were pegged at 5½ cents per pound, while the normal value of this grade was about 3 cents per pound. Hard white shavings stopped at 3¼ cents, and the old values ranged from 2¼ cents to 2½ cents per pound; rope, too, never reached the old prices, as its lowest price last year was 3½ cents, against 2¼ cents per pound in the old days.

When shall the waters meet again? When shall the millenium be reached? When shall a state of trade exist that will show a profit to collector, packer and mill? The situation is rapidly shaping itself so that the time draws nearer and nearer, when of itself the channels of business will open up, and slowly but surely trade will be resumed. The slack water will have its turning and the new flood tide will come in with ever-increasing force, swamping pessimism with the buoyancy of optimism, floating new enterprises, turning mill wheels, and in short, will result in the complete revival of trade.

ABITIBI WORKING AT CAPACITY

President F. H. Anson, of the Abitibi Power and Paper Company, Iroquois Falls, Ont., stated at the annual meeting of the company that the mills are at present operating to capacity, which is 500 to 550 tons per day, or 150,000 to 160,000 tons per year. In February 12,200 tons of news print was manufactured, and 13,000 tons sold. He further stated that the company had contracts for far enough ahead to assure a favorable average for the year. When questioned with regard to possible expansion by the company, Mr. Anson pointed out that the organization had, during the past few years, carried on quite an extensive program in the matter of expansion, with the result that it is now in a position to cope with readjusting conditions, having wood enough to last for about sixty years and a present surplus of developed waterpower. In this connection he pointed out that shareholders would be looking for dividends and when disbursements are resumed he wished to see it done on a permanent basis.

A. J. Brown, K. C., was elected to the board to fill the vacancy created by the retirement of Shirley Ogilvie. Otherwise the retiring board was re-elected as follows: F. H. Anson, president; Alexander Smith, vice-president; Sir Thomas Tait, George H. Kilmer, K. C. George, E. Challes, W. K. George, Victor E. Mitchell, K. C., W. A. Black.

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Paper Makers' Chemicals Show Big Decline

Greatly Decreased Demand by Domestic Consumers and Decline in the Unusually Heavy Export Demand, Due to the Foreign Exchange Situation in 1921, Made It Difficult to Keep Prices at a Point Where Production Was Profitable—This Situation Caused Many Manufacturers to Reduce Their Prices to Levels Which Cannot Long Be Continued Unless Cost of Production Also Is Reduced.

Written Especially for the Annual Number by G. A. Gardner, Manager Chemical Division, M. Gottesman & Co., Inc.

In reviewing changing conditions in the industrial chemical market during 1921, the most striking fact presenting itself is the sharp reaction from the high prices prevailing during the greater part of the previous year. These prices were brought about by a very unusual demand from practically every industry using chemicals during 1920.

During 1921 the buying of chemicals by domestic consumers was greatly reduced and as the heavy export demand also grew less due largely to the adverse foreign exchange situation, the lack of demand made it increasing difficult to keep prices at a point where production was profitable. Many chemical manufacturers have reduced their prices below actual production costs in an endeavor to stimulate business and this condition of course cannot long continue unless they can at the same time reduce their production cost materially. The tremendous decline in chemical prices is best illustrated by the table given below which shows the peak prices of 1920 as compared with present day quotations on several of the important chemicals used in the paper and pulp industry.

Prices for Works—In Carload Quantities

	Peak Prices, 1920	1921	April 1, 1922
Aluminum sulphate, com. in bags.	$4.50/100 lbs.	$2.50/100 lbs.	$1.40/100 lbs.
Aluminum sulphate, iron free in bags	6.50/100 lbs.	3.50/100 lbs.	2.00/100 lbs.
Bleaching powder, 35/37%, in drums	7.50/100 lbs.	2.75/100 lbs.	1.75/100 lbs.
Soda ash, light, 58%, in bags....	4.00/100 lbs.	2.15/100 lbs.	1.50/100 lbs.
Caustic soda, 76%, solid, in drums	6.50/100 lbs.	4.10/100 lbs.	3.25/100 lbs.
Salt cake, in bulk carloads.....	50.00 ton	30.00 ton	21.00 ton
Sulphuric acid 66°.....	24.00 ton	19.00 ton	17.00 ton

Sulphate of Alumina

Alum manufacturers, during the past year, have greatly reduced their prices and quotations are now being made on what appears to be a very sound basis. It is unlikely that any further reduction in price can be made until the freight rates have been reduced, as the high freight rates on the raw materials, which in most cases have to be transported considerable distances, greatly add to the cost of production. Present quotations are now very close to a pre-war figure. One of the leading alum manufacturers estimates that while his present selling price is only about 20 per cent above the 1914 figure, his cost of production including extra freight charges is still 50 per cent above the pre-war basis.

Bleaching Powder

There has been a steady reduction in the price of this material during 1921 from the peak price of 1920 when bleaching powder due to its scarcity and the heavy demand went to an unusually high figure. Quotations are being made today by domestic manufacturers on a basis that can hardly allow a further reduction, and as the consuming demand reaches more normal proportions, it is quite likely that prices will become firmer. During the past year a considerable tonnage of foreign bleaching powder was brought in.

Caustic Soda—Soda Ash

During the past year the alkali manufacturers have revised their schedule several times, bringing their prices very far below the 1920 prices. During the past few months the export demand for caustic soda and soda ash has shown marked improvement and it is very likely that present quotations will be firmly maintained for the balance of the year.

Salt Cake

During 1920 the heavy demand for this chemical from the glass and pulp manufacturers and for export combined with a production somewhat below normal, forced prices to unusual figures. During the past year there has been a gradual decline in prices from the 1920 quotations, but due to the greatly lessened production of the acid of which salt cake is a by-product the demand has practically kept pace with production and present prices are only nominal as manufacturers have practically no stocks of salt cake on hand, and it would take very little increase in the consuming demand to force prices upward. Present quotations will, in all likelihood, be firmly maintained, and as the consumption becomes more normal higher price levels may be looked for.

Present Prices Unusually Favorable

Many of the leading items are being sold today at prices that appear to offer every inducement to the buyer to cover his requirements for the coming months on a safe price basis, as it is quite likely that with an increasing demand which has already begun to be felt by the manufacturers, prices will be advanced to a level calculated to allow a possible profit to the producers. In considering price reactions during the coming months, consideration also must be given to the fact that there will very likely be a change in the tariff, increasing considerably the present duty on many chemicals. This will give a much needed stimulus to American chemical manufacturers and may tend to stabilize prices and market conditions.

The Exchange Situation

The foreign exchange situation has shown signs of a slow but sure improvement and with this improvement there will undoubtedly come an increase in the demand for chemicals from foreign buyers, and we may confidently look to a decided increase in export business in the near future.

Indications are that as a whole business is tending toward better conditions and while it is true that the improvement is more largely a potential one in conditions than an actual one in business transacted, this offers the manufacturer and trade a quite certain basis on which to calculate the prospects of the approaching months.

PAPER COMPANY BUILDS NEW SLUICEWAY

About one hundred thousand dollars is being spent on improvements to the plant of the Fort William Paper Company at Fort William, Ont. A sluiceway a quarter of a mile long is being constructed leading from the woodroom of the mill to the reservoir in which the pulpwood is boomed. The sluiceway has a heavy steel bottom and a conveyor, and will enable the company to manufacture wood more conveniently, eliminating the heretofore costly method of handling it from railway cars.

Plain Speaking

Wholesale *Merchants* strongly prefer Union Paper Bags —because, once introduced, Union Paper Bags *resell* themselves to the retail trades.

Equipped with Union Paper Bags, the wholesale merchant is relieved from frequently combing the bag market to find out "who's making a good one *now*." With Union Paper Bags as his standard, the wholesale merchant saves the valuable sales-time and sales-effort otherwise constantly devoted to selling the retailer "off" the old and "onto" the new. And Union Paper Bags are a foundation on which the wholesale merchant can *afford* to build up a business.

The *reason* why Union Paper Bags occupy this enviable position is simple: Union Paper Bags are stubbornly built up to a standard of service-to-the-retailer—a standard unaffected by costs, by the vagaries of material-supply, or by market-conditions.

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Paper Industry in Wisconsin Slowly Improving

Past Year, However, Has Been One of the Quietest and Most Distressing That Has Been Experienced in a Long Time—While Building Did Not Completely Cease, No New Projects Were Undertaken and There Was Less Construction Work Than in Several Years—Several Large Bond Issues Floated to Finance Building Operations in Progress or Completed—Forest Conservation Getting More Attention.

Written Especially for the Annual Number by John R. Reidl

There has been a decided improvement in the paper industry in the last 12 months, and there will continue to be a slow and steady improvement during the spring and summer months. That is the almost unanimous opinion of paper manufacturers in the Fox River valley. Business is manifold better than a year ago and a constant but slow improvement is expected.

An Exceptionally Quiet Year

The year now ended was one of the quietest and most distressful in the industry in many years. It has seen a complete readjustment from the expansion of 1920, and now most of the mills are in fair shape to take advantage of every improvement in business.

Close students of the paper industry in the Fox River valley do not expect a thorough revival of business until after the farm crop is harvested next fall. There was a material improvement in business last fall after the harvest, in spite of the generally low prices which farmers received, and paper mill men believe that another good crop will so enlarge the farmers' purchasing power that all forms of business will be benefited.

Mill men in the valley generally believe, however, there can be no real revival of industry until there is a readjustment of all prices in their relation to each other. They contend that business cannot approach normalcy so long as prices in some lines are all out of proportion to other lines.

Reduction in costs is necessary to bring about this readjustment in prices, mill men here say. High retail prices are blamed here in the failure of retailers to reduce their operating costs. In many instances employees in mercantile establishments are receiving the same salaries as were paid in war-time, and consequently these establishments have been unable to lower their prices in proportion to the decreases in wholesale prices. There is quite a disposition here to blame the retailer for high prices, not because his margin of profit is kept large, but because he has failed to reduce operating expenses.

Paper Prices Much Lower

Paper prices now, according to mill men here, are within 33⅓ per cent of 1913 prices, but costs are from 75 to as much as 180 per cent above the 1913 figures. Paper mill men say, comparison with 1914 prices is not just, inasmuch as the paper industry, along with most others, was in a bad slump which threatened to become a serious period of depression when the war broke out.

Labor generally is from 60 to 90 per cent above 1913 costs. Pulpwood, coal and other materials, due quite largely to extremely high freight rates, in some instances cost 180 per cent more than they did in 1913.

Freight rates are responsible in quite a measure for these abnormally high material costs, and labor costs are responsible for the high freight rates. Readjustment of freight rates to other costs, so necessary to complete revival of industry, cannot come about until wages on the railroads and in the coal mines are on a level with wages in other industries, it is believed here.

While there was not a complete cessation of building in the last year, no new projects were undertaken, and there was less construction work than in several years. Projects that had been started before the depression were completed and some plans were made for future expansion, but very little new work was started.

Large Bond Issues Floated

Several large bond issues were floated to finance building operations in progress or completed. The largest of these was floated by the Kimberly-Clark Company to finance the work at Kapuskasing, Can., where building operations are almost at a standstill. Other companies which floated bond issues were the Thilmany Pulp and Paper Company, Riverside Pulp and Paper Company, Fox River Paper Company, Consolidated Water Power and Paper Company, and the Tomahawk Pulp and Paper Company. Very little difficulty was experienced in disposing of any of these issues and some of them now are selling slightly above par.

New Projects Get Setback

New paper mill projects in the state were given a severe setback by the depression period. The Valley Paper Mills of Neenah, organized in 1920, had planned to begin building operations in the summer of 1921, but work was deferred until this year. Officers of the company said excavating for the new plant at Neenah would start about the middle of April. An intensive stock selling campaign has been carried on for several months. The new company, according to its officers, will manufacture glassine, greaseproof and French folio papers. The plant will represent an investment of about $800,000, it is said.

The last year saw absolutely no new developments in the Northern Peshtigo Pulp and Paper Company, which was organized to establish a power plant, pulp and paper mill on the Peshtigo River, several miles above the Peshtigo Pulp and Paper Company's plant. The site was surveyed, some stock was sold and nothing more was done. Recently stockholders filed complaint against the company and the Wisconsin Railroad Commission has been conducting hearings on and investigating the stock sales carried on by the company.

There has been a marked absence of new mill promoting in the last year. In 1920, and even in the year before that, rumors of new paper mills were current at all times. Not less than a half-dozen promoters were considering establishments of mills and interesting investors just prior to the big slump in the market.

There was very little activity at the Kimberly-Clark Company's development at Kapuskasing in the last year. The sulphite mill has been started and could be completed in about two to three months. Other units have been completed, and it is said the company is in a position to begin operating on a reasonably short notice if conditions should warrant. There is little likelihood of active operations, however, until there is a decided improvement in the paper market.

The Consolidated Water Power and Paper Company at Wiscon-

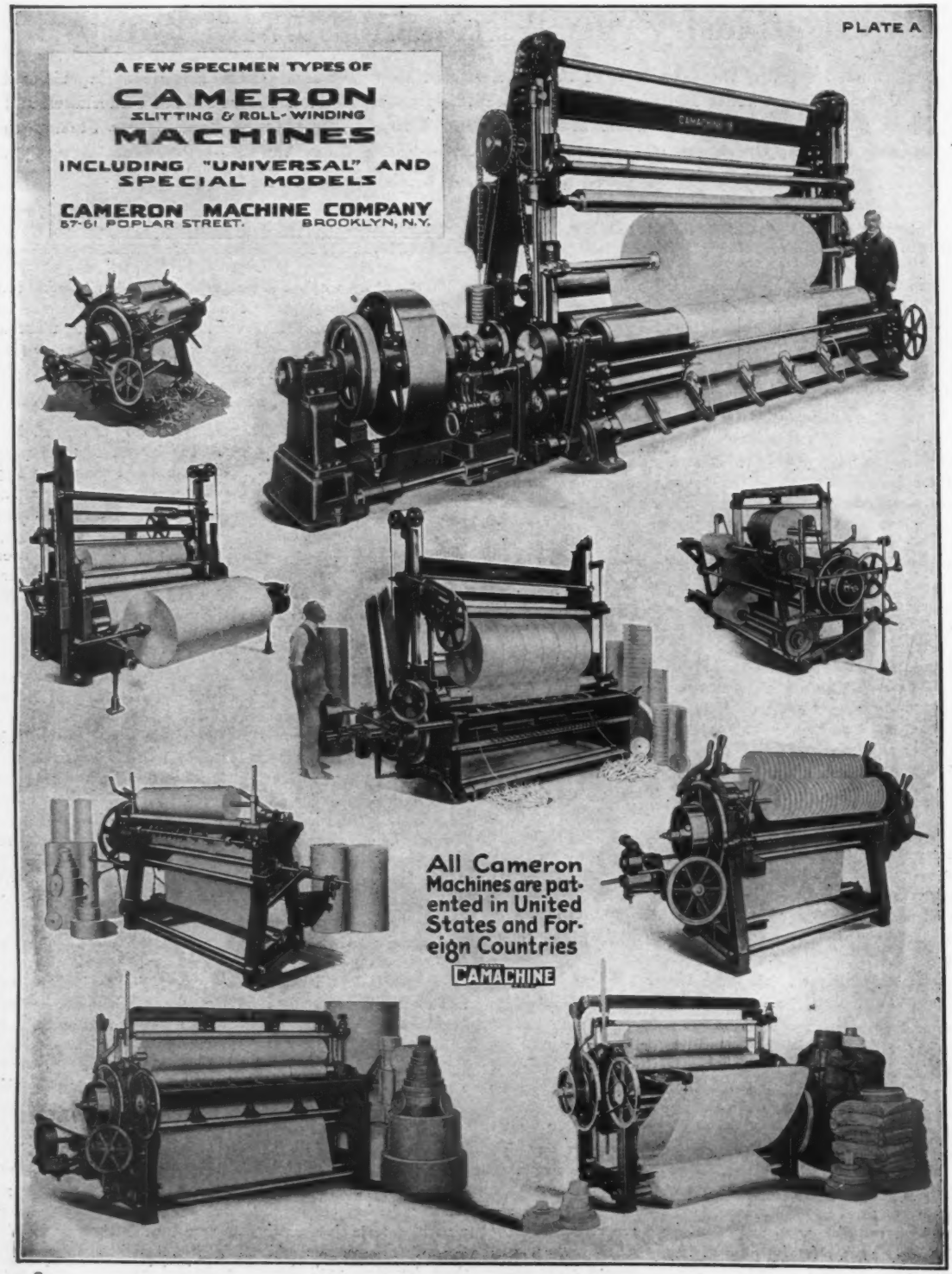
PLATE A
A FEW SPECIMEN TYPES OF
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MACHINES
INCLUDING "UNIVERSAL" AND SPECIAL MODELS
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sin Rapids completed its big construction program, started before the depression. One of the most notable achievements in the entire industry during the year was installation of the mammoth news print machine in the Wisconsin Rapids mill. The machine was installed early last year and began operations without mishap. It has been considerably speeded up and is now one of the fastest, if not the fastest machine in the world. The Consolidated company's program included, besides the big paper machine, a new sulphite plant, power plant and a transmission line from Wisconsin Rapids, through to Biron and Stevens Point. This line was built to equalize power between the three plants.

Considerable rebuilding was carried on at the Tomahawk Pulp and Paper Company plant at Tomahawk during the last year and it was very nearly entirely rebuilt. It now is one of the most modern plants in the country and is operating at capacity. The Pride Pulp and Paper Company plant also has been in operation for several months, although the entire project, as originally planned, has not been completed. These companies recently signed a five-year contract which will take up practically the entire product at a price which insures a satisfactory profit. The two companies are said to be in splendid condition.

Reorganization of the Northern Paper Mills followed labor troubles in the company's plants last May. The mills were closed down for several weeks when Judson G. Rosebush and other men acquired large interests and reorganized the company. The strike was settled and production was started almost immediately. Now the mills are operating at nearly normal capacity and the business outlook for the future is decidedly promising.

Green Bay was the scene of another important development in the paper industry. This was the merger of the Green Bay Fibre and Paper Company and the John Hoberg Company, recently effected. The Hoberg family has large holdings in the new company. The two plants now are being operated under one management.

Improvements constantly are being made at the Marionette and Menominee Paper Company mills in those two cities. These improvements include installation of a new paper machine and some new construction work. Other improvements now under way and contemplated are designed to make the mills among the largest and most modern in the country.

The Fox River Paper Company completed its rebuilding of the Telulah mill, purchased from the Kimberly-Clark Company in 1919, but thus far business conditions have not warranted operation of the plant on anything like an extensive scale. The former Lakeside mill, now the Lakeview Paper Company plant, purchased by Lewis Alsted and his associates in 1919, has been in continuous operation. Extensive improvements were completed in that plant in the last year. There was considerable building in the Combined Locks Paper Company plant in 1921, but the mill has been operating at capacity at all times.

This company suffered a severe loss when the Valley Pulp Company mill at Kaukauna, a subsidiary organization, was destroyed by fire. The Valley Pulp Company will not rebuild, but a movement was launched at Kaukauna to erect a new mill, but thus far nothing of consequence has developed from that movement.

Large Stocks of Pulpwood

Most of the mills were quite well stocked with pulpwood before the logs cut during the last winter began to arrive and now the yards are filling up. An extraordinarily large amount of wood arrived in the valley and in the state in 1921. Consumption of wood was below normal and consequently many companies carried over immense stocks. The cut last winter was not nearly as great as in the previous year, it was said.

Wage Readjustments

Wage readjustments, inevitable when the bottom fell out of the paper market, were started last March and some difficulty resulted. Strikes were called in Green Bay and in Rhinelander, and in both instances the courts were called upon to prevent violence in picketing. The strike at Rhinelander resulted in an arrest which finally developed into a political issue of considerable magnitude. A striker was sentenced to jail for contempt of court and was ordered pardoned by the governor. The court, however, ordered the sheriff to hold the prisoner, declaring the governor had no power to pardon a man sentenced for contempt of court. The matter was made a political issue and probably will play a considerable part in the state elections next fall.

The paper manufacturers of the state, along with other manufacturers, were intensely interested in an effort by the governor to amend the state income tax law to make income returns public. Under the present law the income reports may not be given to the public. The governor attempted to amend the law, but was defeated in the legislature.

Wage reductions were ordered several times during the year when it became apparent that further cuts were necessary to lower production costs to a point where the mills could continue to operate. These later cuts did not cause nearly as much discussion as those earlier in the year, when the men as a general rule did not thoroughly realize the manufacturers' problems.

Conservation of Forests

Forestry and conservation of Wisconsin's timber lands was given much attention during the year. Attempts were made to secure adequate legislation covering this, with only partial success, but sentiment has been created which will be sure to result in definite action when the legislature meets in 1923. Newspapers have taken up the movement and are working together to secure an appropriation sufficient to reforest Wisconsin's cut overlands which are not suitable for farming and there are thousands of acres of that kind of land in this state. Leaders in the movement are confident of considerable progress next year.

Cellucotton Products Co.

The Kimberly-Clark Company, which is the chief stockholder in the Cellucotton Products Company, made remarkable strides in that industry in the last year. From a very small start, only a little more than a year ago, the industry has grown until the present quarters are too small and provisions are made for enlarging the plant and installing new machinery.

Awaiting Business Revival

Most of the paper companies in the state now are in fairly good condition for the revival of business which is sure to come soon. Wages now are on a fair level, plants are in good shape and everything is in readiness for maximum production as soon as a market warrants.

TO DISTRIBUTE BROWN LINES IN MIDDLE WEST

To adequately supply the increasing demand for their high-grade papers in the Middle West, the L. L. Brown Paper Company, of Adams, Mass., finds it necessary to have another distributor in this territory.

The Central Ohio Paper Company, with complete staffs of high-class salesmen and unexcelled warehouse and distributing facilities, has been selected to represent the Brown lines, whose mills at Adams were established in 1849, and whose equipment, which is of the most modern and improved type, enables them to produce large quantities of the finest grades.

The strategic location of The Central Ohio Paper Company's warehouses, carrying complete stocks, will prove a great convenience for the users of Brown's paper and insures at all times prompt and quick delivery to all points throughout the territory they cover.

Advance Bond is a powerful PAPER

ADVANCE BOND not only is powerful, but it has the fine look of power that gives both force and distinction to correspondence.

Advance Bond is a notable product of the L. L. Brown Paper Company, who have made quality papers at Adams, Mass., since 1849.

Advance Bond is made up to a quality, not down to a price. Recommend Advance Bond to your customers desiring a paper powerful both in strength and appeal.

This watermark identifies all Brown's Papers

L. L. BROWN PAPER COMPANY
Adams, Mass., U.S.A.

For three-quarters of a century, makers of

LEDGERS, LINENS AND BONDS

An Unsatisfactory Year in Michigan

Fluctuating Prices, Uncertain Costs, Wage Reductions and Greatly Reduced Profits Among the More Important Factors That Served to Make the Past Year an Unpleasant Memory—Munroe Continues Active in Maintaining Its Position as the Leading Box Board Producing Center of the Middle West—Numerous Consolidations and Financial Expansions Reported—New Machinery Installed.

Written Especially for the Annual Number by Howard P. Hall

Michigan papermakers, practically without exception, stand ready to assert that 1921 will go down in history as one of the most unsatisfactory years ever experienced in their respective business careers.

A dull, spotty market, prices fluctuating, costs uncertain, sales more uncertain, wages to employees slashed, dividends to stockholders either greatly reduced or entirely passed, and heavy losses forced on all concerns are a few of the elements that make the past year an unpleasant memory.

Profits Practically Unknown

Conditions in the Kalamazoo valley district are indicative of what exists throughout the length and breadth of the state. Profits are practically unknown, the exceptions being in cases of small concerns. Three companies, operating one machine mills in the Kalamazoo valley, are known to have run without loss. They are the Rex Paper Company, Sutherland Paper Company and the Watervliet Paper Company. The Rex and Watervliet were able to maintain dividends at a fairly high rate during 1921, while the Sutherland's reduction was merely to conserve and increase working capital.

Yet 1921 did not pass without its happenings of moment. The paper industry is too well founded in Michigan to ever succumb to anything like a permanent setback and indications are that it will greatly increase in importance and magnitude with the coming years in the future.

New Machinery Installed

Briefly summarizing these happenings, it can be noted in the Kalamazoo valley that the Eddy Paper Company, at Three Rivers, completed the installation of the second unit in its No. 3 mill, a 126 inch seven cylinder machine, and additional auxiliary machinery, also extensions in its big box factory; the Sutherland Paper Company, Kalamazoo, put in operation its one machine mill for the manufacture of carton raw stock; the MacSimBar Paper Company, Otsego, has begun the erection of a high grade power plant, while such concerns as the Bryant Paper Company, Kalamazoo Paper Company, King Paper Company and the Watervliet Paper Company carried on campaigns of improvement looking to the general upkeep of their respective plants to a high degree of efficiency.

The new soda fiber plant of the Northern Fibre Company, at Ontonagon, was completed and put in operation, while extensive improvements were made by the Hoskin-Morainville Company, Menominee. The Northern Michigan Pulp Company, Petoskey, overhauled its bleached sulphite fiber mill, greatly enlarging its capacity.

Mills to Be Built

Before the year 1922 ends, at least two new mills will be under construction in Michigan. The Kalamazoo Vegetable Parchment Company is already actively engaged in the preliminary work leading up to the erection of a modern two machine mill. All details as to plans and specifications are in the hands of Billingham & Cobb, engineers engaged to handle the job. The Filer Fibre Company, Manistee, has also announced its intentions of erecting a paper mill, while the Manistique Pulp and Paper Company is seriously considering an addition to its pulp mill. With the year still young that is a good beginning, indicating growth quite in keeping with any business awakening that may arise.

The Port Huron Sulphite and Paper Company, Port Huron, Mich., is now installing a 120 inch Yankee Fourdrinier machine for the manufacture of machine glazed papers from 17 to approximately 50 pounds basis.

The original structure was laid out for two machines and the only addition required was an addition to the finishing room, 70 by 100 feet in dimensions, one story and basement. This building is reinforced concrete to the first floor, above being brick pilastered with steel sash. The roof material is 4 by 8 fir, four ply built up roof covering and one ply of waterproof roofing on the inner side of the 4 by 8 and this is then sealed with 1 by 6 fir, giving a total insulating thickness of five inches, with an air seal one inch from the bottom surface. This type of roof is reported to be very satisfactory.

Expansion in Munroe

Monroe has done much to maintain its position as the leading boxboard producing center of the Middle West. Two new mills have started during the past year, while one of the really big consolidations in the paper industry was completed there.

The one machine mill of the Monroe Paper Products Company is running satisfactorily and has a capacity of 75 tons every 24 hours.

A Beloit cylinder machine, 112 inch trim, has been installed. It makes all grades of boxboard except white. There are nine Dilts beaters and five Shartle Brothers jordans, all electrically driven. The company generates much of its own electric energy, the power plant being equipped with a Hamilton Corliss engine and General Electric generator. There are three 400 horsepower McNaul boilers, equipped with Detroit stokers.

The River Raisin Paper Company put in operation the new unit of its corrugated strawboard mill. It has a capacity of 60 tons daily. The mill structure is fireproof, 720 feet long and with a width varying from 60 to 80 feet. A 92 inch Black & Clawson straw drying machine has been installed, also eight iron rotaries, product of the Biggs Boiler Works, Akron, Ohio, and six 1,500 pound beaters, manufactured by the Valley Iron Works, Appleton, Wis.

The completion of the strawboard mill gives the River Raisin Paper Company a daily output of 500 to 600 tons, requiring a working force of about 1,450 hands. It has storage track capacity for 350 carloads of freight.

Other Improvements

The French Paper Company, Niles, is now occupying its new office and administration building and has also completed a new power house. The total expenditure was about $100,000.

The new wood handling system installed by the Detroit Sulphite Pulp and Paper Company is considered elsewhere.

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EASTERN AGENTS FOR PULP FOR

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D. Graff & Sons, paper stock dealers, have added to their large facilities throughout the state by the erection of a plant and warehouse at Grand Rapids. It has a floor area of 34,000 square feet.

Consolidations and Financial Expansinos

Consolidations and financial expansions have played important parts in Michigan paper mill history the past year.

The organization of the Allied Paper Mills, comprising the King Paper Company and Monarch Paper Company of Kalamazoo and the Bardeen Paper Company of Otsego, was a deal of the very first magnitude. This concern has an authorized capital of $5,000,000 six per cent preferred stock and 5,000,000 shares of no par value common stock. Of the preferred stock, $2,307,500 was issued, also 675,000 shares of no par value stock. The preferred stock covers the liquid assets of the three concerns involved in the merger, while the common stock represents holdings in real estate, buildings and equipment.

This concern now has 10 paper machines and a coating equipment of 34 coating machines and is the second largest company in the Kalamazoo valley district.

Of equal importance was the organization of the Consolidated Paper Company, of Monroe, absorbing the Monroe Binder Board Company and the Boehme & Rausch Company. The new company is capitalized at $5,000,000 in common and $2,500,000 preferred. It includes mills at Monroe and Aurora, Ill., with a maximum capacity of a million pounds of box board and container board every 24 hours.

The Western Papermakers Chemical Company increased its capital stock from $200,000 to $1,000,000. This concern has offices in Kalamazoo, Easton and Holyoke and plans to expand its general line to include numerous chemicals not previously made. This increase in product has been in process for several months.

The Filer Fiber Company, Manistee, has increased its authorized capital 100 per cent, jumping from $500,000 to $1,000,000. This provides for a stock dividend and sufficient additional funds to make possible the erection of a paper mill, to be operated in connection with the sulphate plant.

The Eddy Paper Company, Three Rivers and White Pigeon, to provide needed capital for the conduct of its business, has sold first mortgage gold bonds to the amount of $2,250,000. These run ten years and draw 7½ per cent interest. In addition, 700,000 shares of no par value common stock was authorized and in the sale of the bonds there was a provision that the purchaser of each bond to the value of $100 would receive in addition 15 shares of the no par value stock.

In addition the Eddy Paper Company has previously issued between $7,000,000 and $8,000,000 of common stock of $10 par value and $1,850,000 of preferred stock drawing 7 per cent.

The MacSimBar Paper Company, Otsego, floated an issue of $300,000 first mortgage 7 per cent gold bonds, the funds derived to be used in the erection of a new power house.

Another interesting change in the Kalamazoo valley was the organization of the Waste Paper Packing Company, capital $100,000, being made up of those heavily interested in the Bryant Paper Company. The new corporation absorbed the local plant of Oscar Gumbinsky & Bros. and regularly entered the field of handling paper stock both for the Bryant Paper Company, also selling to other concerns.

Two capital increases have just been reported by Michigan concerns. The Simplex Paper Corporation, Palmyra, advanced from $30,000 to $50,000, while the Northern Paper Mills, Green Bay, Wis., and Ontonagon, Mich., changed from $2,000,000 common to $700,000 preferred and 40,000 shares of no par value common, offered at $35 a share.

One failure occurred during the year, that of Mullen Brothers Paper Company, St. Joseph, Mich. The affairs of this concern are being permanently wound up and the property will be sold.

Widely Known Men Pass Away

Death has exacted a heavy toll since the last convention number of the PAPER TRADE JOURNAL appeared. No less than six men widely known to the trade have passed away. Kalamazoo lost Frank H. Milham, president of the Bryant Paper Company, and John F. King, president of the Rex Paper Company.

E. Golden Filer, a multimillionaire and president of the Filer Fibre Company, died last April in Chicago. Another one to pass on was Frank P. Nicely, president of the LaSalle Paper Company, South Bend. E. B. Zigley, president of the Lincoln Paper Company, died while in the South in quest of health. The last mentioned is John Russell, for several years retired, but during his activity widely known as superintendent of the Bryant Paper Company's Superior division, also of the Bardeen No. 2 mill at Otsego.

Deaths have caused many changes in the official personnel of the various companies. Felix Pagenstecher, assistant to the late President Frank H. Milham of the Bryant Paper Company, is now president of that great concern. Merrill B. King succeeds his father, John F. King, as president of the Rex Paper Company and ranks as the youngest paper mill executive in the Kalamazoo valley. In like manner, Claude E. Nicely has been advanced to succeed the late Frank P. Nicely as head of the LaSalle Paper Company. C. E. Frye fills the vacancy caused by the death of Mr. Zigley, president of the Lincoln Paper Company, while Frank Filer, brother of the late E. Golden Filer, has been elevated to executive head of the Filer Fibre Company.

The death of Mr. Milham affected the future destinies of the Eddy Paper Company equally as much as the Bryant Paper Company. With his passing, Oscar Gumbinsky was elected to head the Eddy. This election resulted in the immediate resignation of Charles E. Nelson, secretary and general manager, and the naming of A. B. Thomas, up to that time with the MacSimBar Paper Company, to fill the vacancy.

Mr. Nelson was in turn immediately elected president of the MacSimBar Paper Company, a position he now holds.

In the meantime Mr. Gumbinsky has resigned as president of the Eddy Paper Company and Charles A. Blaney, of the Wheeler-Blaney Company, Kalamazoo, has been elevated to the position. Mr. Blaney immediately gave himself over to the task of ironing out financial problems that confronted the Eddy company and has succeeded admirably in his efforts.

WEIS FIBRE CONTAINER CO. BURNED

Fire, Sunday afternoon of last week, destroyed the fine plant of the Weis Fibre Container Company at Monroe, Mich., and an immense stock of materials, the loss being about $1,000,000, partially covered by insurance.

The Weis plant was found in flames while the entire city fire department was fighting a conflagration at the home of Eugene C. Betz, vice-president of the Consolidated Paper Company and former mayor of Monroe. The Betz home is located at some distance from the Weis plant and was practically destroyed by a blaze that originated in the basement. The loss to the Betz family will be about $10,000. All were out of the city and knew nothing of their loss until notified by long distance telephone.

Fire at the Weis plant was discovered at the rear of the building and that section was a mass of flames when the alarm was turned in. Firemen were hampered by heavy smoke and low water pressure and the flames spread rapidly to an immense stock of paraffin covered containers that burned fiercely.

The Weis company planned to begin operations with 300 hands on Monday of last week, or twice the force employed during the past six months. It is understood the plant will be rebuilt.

The fire does not in the least affect the Weis Manufacturing Company, the Weis Fibre Container Company being an entirely separate organization.

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Trying Period in Quebec and Maritime Provinces

Many Mills in Eastern Canada Hard Hit by the Lessened Demand and Falling Prices, and All Have Had to Carry Out a Thorough Reorganization of Staff and Working Conditions in Order to Weather the Storm—Sensational Break in Practically All Pulp and Paper Securities During the Year—Indications Now, However, That the Industry Is Reaching a Better Footing—Some Interesting Statistics.

Written Especially for the Annual Number of the Paper Trade Journal by C. L. Sibley.

Since the date of the last Convention, the pulp and paper industry in Canada has passed through the most trying period in its history. Many of the mills in Eastern Canada have been hard hit by the lessened demands and the falling prices and there is not one which has not had to carry out a thorough reorganization of staff and working conditions in order to weather the storm. The year began with a marked decrease in the demand for both pulp and paper, into the causes for which it is not necessary to go into in this article. The situation was aggravated by the coming into operation of additional producing plants whose inception many months earlier had been predicated upon the expectations of a continuance of the rate of consumption which had developed in the early part of 1920 and which had outrun the capacity of the mills then operating. Then again when the slump came most of the mills found themselves with huge piles of wood and other raw materials which had been purchased during the war period at high prices and the value of which had to be written off by from 40 to 50 per cent at least in order to be able to manufacture pulp and paper at the new competitive prices.

News Print Demand Falls Off

Roughly it is calculated that the demand for Canadian newsprint during the year fell off from 10 to 15 per cent as compared with the previous year while the Canadian mills had increased their capacity about 17 per cent. Quite recently, with the coming into operation of the International Paper Company's subsidiary's new mill at Three Rivers, which subsidiary is named the St. Maurice Lumber Company, with an estimated capacity of 240 tons a day, the increase in the total capacity of Canadian mills over the capacity in the year 1920 is about 25 per cent. This increase in capacity coupled with the falling off in demand has naturally caused considerable embarrassment but indications are now that the industry is reaching a better footing and that within a couple of years, or three years at the outside, the demand will have overtaken the production.

The capacity of the 16 mills operated in Canada to-day is 3,652 tons a day or 1,005,600 tons per annum. Five Canadian mills have increased their production during the past year as follows:

Mills That Increased During Year

	Daily	Yearly
Abitibi	250	75,000 tons
Laurentide	125	37,500 tons
Ontario	50	15,000 tons
Price Brothers	50	15,000 tons
Spanish River	50	15,000 tons
Total	525	157,500 tons
New Mill—		
International Paper (St. Maurice Co.)	240	72,000 tons
Total	765	229,500 tons

The following is now the list of the sixteen news print mills in Canada and their capacity:

Name of Mill	Tons Capacity Daily	Tons Capacity Yearly	Tons Increase in Year
Abitibi	500	150,000	75,000
Belgo-Can.	220	66,000	
Booth	145	43,500	
Brompton	110	33,000	
Canada	42	12,600	
Donnacana	105	31,500	
Eddy	55	16,500	
Laurentide	350	105,000	37,500
Ontario	280	84,000	15,000
Pacific Mills (B. C.)	225	67,500	
Powell River	235	70,500	
Price Brothers	310	93,000	15,000
St. Maurice Lumber Co.	240	72,000	72,000
St. Maurice Paper Co.	120	36,000	
Spanish River	575	172,500	15,000
Fort Frances	140	42,000	
Total	3,652	1,095,600	193,500

The following table shows the total annual capacity of all the pulp and paper mills in Canada as brought up-to-date by the additions made during the year:

WOOD PULP

(Produced for sale as distinct from that produced for producer's own use)

	Tons
Mechanical pulp	407,300
Sulphite (all grades)	469,096
Kraft	148,400
Total	1,024,796

PAPER

	Tons
News print	1,095,600
Fine papers	58,228
Wrappings	58,697
Boards	137,678
Other papers	40,065
	1,390,268

Sensational Break in Paper Stocks

Early in the present year there was a sensational break in practically all the pulp and paper securities of the Montreal Stock Exchange, the most startling being those of the Riordon Company, which fell as much as 70 points during the week ending April 25 and finished up with a break of over 200 points from the high price of 1920. The break followed when the company's new mills

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MOSS POINT, MISS.

Machine Glazed and Fourdrinier Kraft Paper

at Kipawa were closed down in addition to those at Hawkesbury. It soon became known that the company had become embarrassed by over-expansion, and the alarming falling off in the demand for sulphite pulp which is the company's principal product brought matters to a crisis. The acquisition of huge timber limits in the Gatineau Valley necessitated new financing which the company found itself unable to carry out. In consequence early in May a letter was sent to the shareholders by a committee formed to reorganize the company asking them to subscribe the whole amount of a new issue of $5,000,000 in trust bonds. The letter stated that if this amount were not forthcoming by June 1st it would be impossible to carry on the business of the company and liquidation would be the only alternative. The letter further stated that the financial position of the company was serious and the current liabilities amounted to $14,214,483, while the current assets amounted to $10,451,680. Therefore, the current liabilities exceeded current assets by $3,762,803.

The committee found that the present position of the company was due mainly to three outstanding causes. First, the fact that commitments for construction and other expenditures were undertaken before adequate financial arrangements were made; secondly, because the construction expenditures on the Kipawa plant exceeded the original estimate of cost; and thirdly, because of the world-wide reaction and general trade conditions. Shipments and consequently the receipts, had fallen far below those anticipated, it is stated. These combined factors made it of the utmost urgency that further working capital be furnished at once.

The shareholders showed great unwillingness to subscribe further capital. The decline in the stock continued and before the end of the summer the three stock issues of the company had fallen in value from $48,800,000 to less than $1,200,000, a decline unprecedented in the history of the Stock Exchange of Canada. Ultimately the creditors of the company decided to grant an extension of credit to the company for one year expiring November 19, 1922. The company has since reopened its plants at Kipawa and Habikesbury and is now operating under favorable conditions.

Progress of the Abitibi Co.

Among the mills which have made great progress in a year in which expansion has been regarded as something more or less regretted is that of the Abitibi Power and Paper Company. The three new paper machines which have been installed have raised the capacity of this company from 250 tons a day to 500 tons a day. In addition the company has put in a new wrapping paper machine with a capacity of 35 tons a day. Two of the machines now have the distinction of being the largest paper machines in the world. They make a sheet of paper 221 inches in width. The machines were built by Chas. Walmsley Company, of Bury, England. During the year the company has also completed the power plant at Twin Falls and installed four generators of 6,000 h.p. each, thus getting 24,000 h.p. The company has always pursued an independent course as regards marketing its product and has been fortunate enough to secure contracts that will permit the mill to run at full capacity. One of the contracts secured by the company is said to be one with the Hearst organization for somewhere in the neighborhood of 120 tons a day. Early in the year the company decided to reduce its quarterly dividend from $1.50 to $1.00 a share on the 250,000 shares of no par value outstanding. The announcement was accompanied by a statement that the earnings for the quarter warranted a large dividend distribution but it was deemed advisable having regard to current business conditions to maintain a favorable liquid position for the company. Later in the year the dividend was discontinued but shareholders were informed that the company's operations continued to be very satisfactory and that net earnings were more than sufficient to pay the dividend. Other favorable reports as to the company's business continued to be made and the action taken by the directors to preserve the liquid position of the company was generally commended in view of the large outlays the company has made on extensions.

The Laurentide Co.

In connection with the Laurentide Company the feature of the year was that the two new machines which had been built for the company by the Dominion Engineering Works at Lachine, Que., were installed and put into operation. These machines are each of 166 inches in width and since they were installed they have been steadily and satisfactorily turning out news print at the rate of from 1,000 feet to 1,200 feet per minute. The output of these machines, which is around 150 tons of news print per day, had already been contracted for to the New York *Times* for a period of five years. The company, which is in an exceptionally strong position financially, has maintained its dividend of 6 per cent throughout the year.

Other Extensions During the Year

Apart from the extensions to news print mills during the year there have been a number of important developments. For instance, the Belgo Industrial Company, Limited (formerly the Belgo Pulp and Paper Company), at Shawinigan Falls, Que., has extended its groundwood mill and installed four new magazine grinders, bringing the production up to 80 tons a day.

The Brompton Pulp and Paper Company has put a new groundwood mill into operation while Clarke Brothers have brought into operation a new kraft pulp mill at Bear River, N. S., with a capacity of 50 tons a day.

The Wayagamack Pulp and Paper Company, Three Rivers, has installed two new paper machines, bringing the capacity up to 200 tons of kraft pulp and paper daily.

The Howard Smith Paper Mills, Ltd., have installed a new machine at Beauharnois for the manufacture of bond paper. It has a capacity of 7 tons a day. Another machine for manufacturing sulphite bond and book paper has been installed at the company's Crabtree Mills with a capacity of from 15 to 18 tons a day. The company has also put in a small new groundwood mill for producing high grade mechanical pulp for its own use. At Cornwall, Ont., it has secured the control of the Toronto Paper Manufacturing mill and has put in an entirely new plant with a capacity of 65 tons of bleached sulphite per day.

The Embargo on Pulpwood Exports

At various times during the past year the question as to the embargo on the export of pulpwood has come up for discussion. For instance, the clause affecting news print in the Fordney Bill was interpreted here as an attempt to make the Canadian Provinces abandon their position on an embargo. When it was proposed at Washington to appoint a commission to come to Canada with a view to getting the embargo removed, Premier Taschereau on behalf of the Provincial Government, made the emphatic assertion that under no circumstances would the embargo against the export of pulpwood from Crown Lands be removed. The position here now in regard to this question may be summed up as follows:

From privately owned lands pulpwood may be exported freely and indeed is being exported in large quantities to the United States. The Dominion Government has no power over the disposition of the products of the forests. Under the British North American Act, each Province has full control over its own natural resources, with the exception of the Prairie Provinces which were not formed at the time of confederation. The Provincial regulations for restricting the export of pulpwood are imposed by the Provincial Governments. They are not in the nature of an embargo as such, but are a condition in the leases granted to those who are allowed to cut timber on the Crown Lands. As far as Quebec Province is concerned, there is absolutely not the slightest possibility of these restrictions being abrogated. The people are a solid unit in favor of prohibiting any of the Crown Lands' timber from being cut for export in the raw state. It is thought here that the

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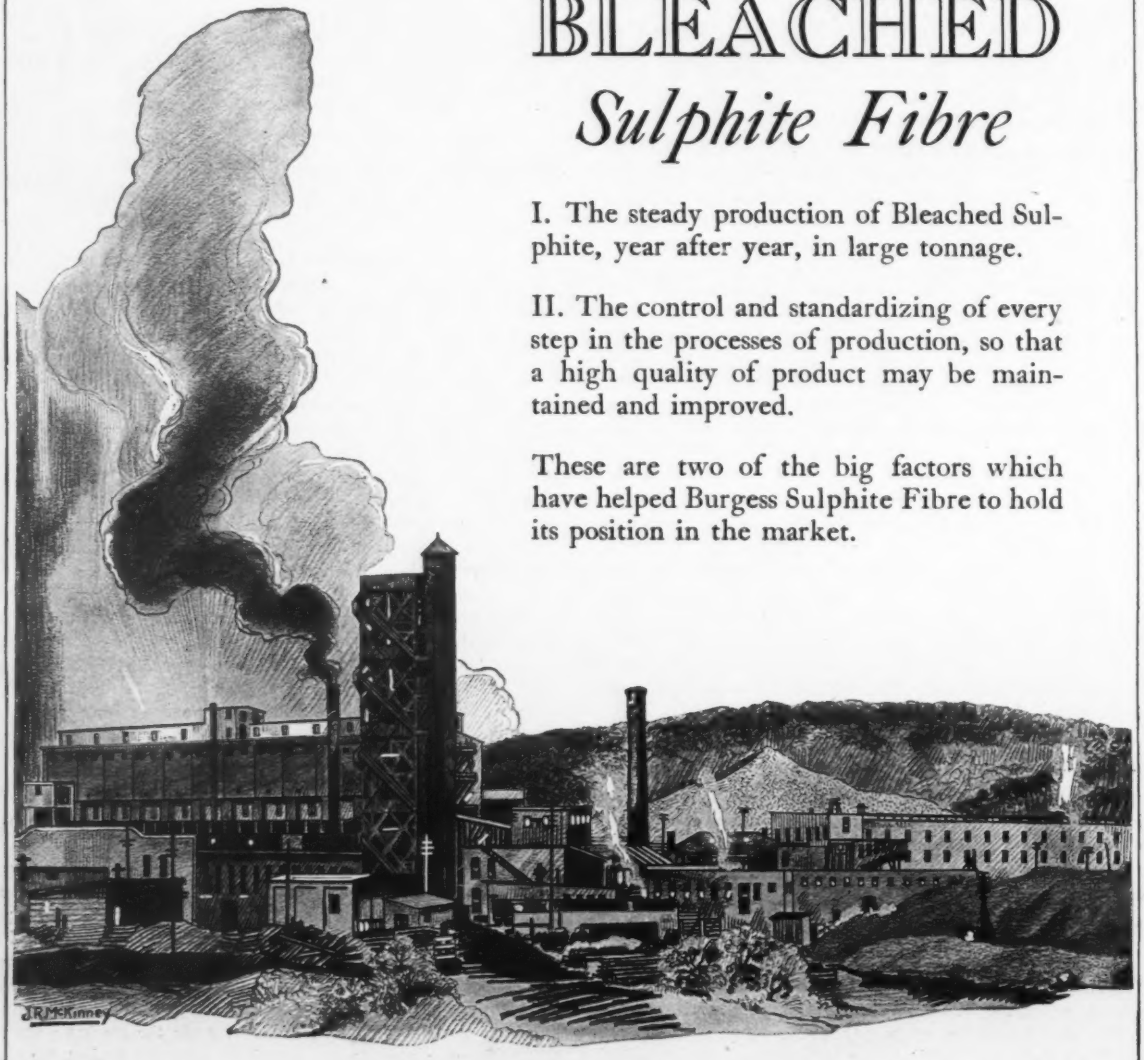

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resolution passed in the American Senate was intended to forestall, if possible, any further restrictions on the export of pulpwood. But if there is any hope that the present restrictions will be lifted then those who entertain such a hope are doomed to disappointment.

A feature of the discussion on the subject was the proposal by Frank J. D. Barnjun, the well-known pulp manufacturer in Eastern Canada, to put an export tax of $10 per cord on all pulpwood shipped from private limits but this has not been taken up seriously for the present.

Canadian Paper in Australian Markets

The new Australian tariff, by which a preference is given to the paper manufacturers in the United Kingdom as against paper manufacturers in Canada or elsewhere, has considerably affected the exports of paper from Canada to Australia and during the year negotiations have been in progress to effect a reciprocal arrangement by which Australian products will get a preference in Canadian markets in return for preference on Canadian products in Australian markets. At the time of writing there is every prospect of a reciprocity agreement being arrived at which will include paper.

Reorganization of Canadian Export Paper Co.

A feature of developments during the year has been the reorganization of the Canadian Export Paper Company. This came about following the unprecedented drop in the price of news print early in the year. Formerly the Canadian Export Paper Company marketed all the products exported by the following companies: Laurentide, Price Bros., Belgo-Canadian, Brompton, St. Maurice, Provincial, Inter-Lake and Howard Smith. When the price of news print began to drop and other companies began to quote competitive prices there was some discussion as to price maintenance among the companies composing the Export Paper Company. Ultimately several of the companies resigned from membership and the company was reorganized. Under the new arrangement it includes only the Laurentide Price Brothers and Brompton companies. G. F. Steele, the former general manager of the company, resigned, and Guy Tombs, the transportation manager, also resigned and formed a transportation company of his own to specialize in the handling of paper shipments.

Development of Water Powers

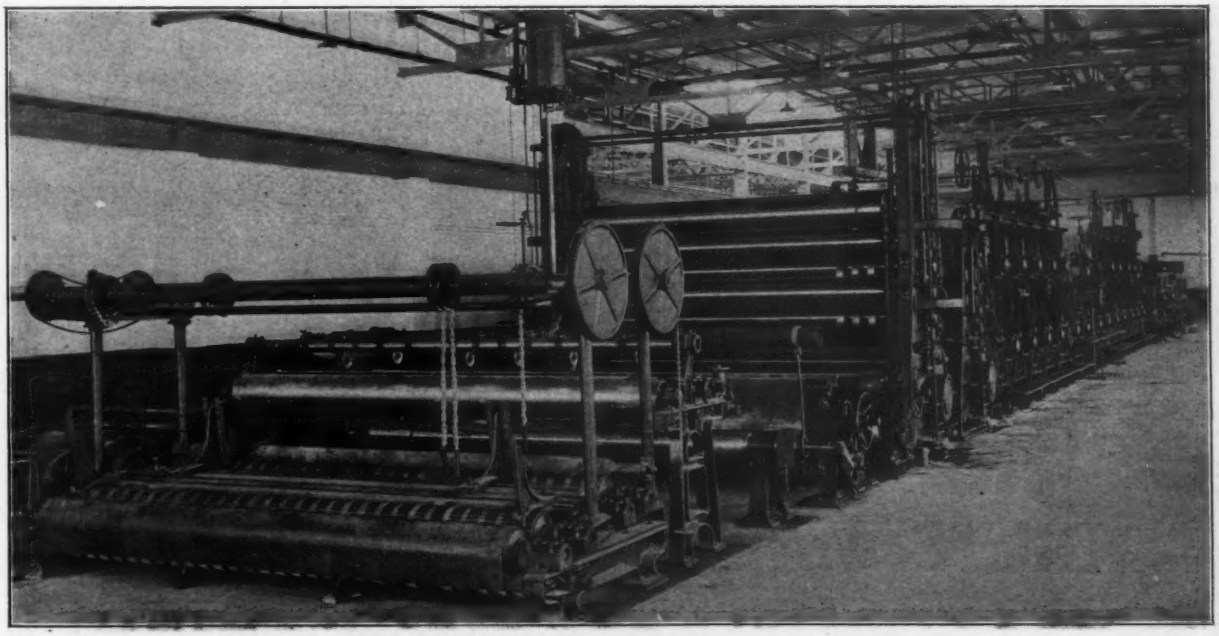
Several large schemes for the development of water power in Eastern Canada have recently come up for consideration. The Public Service Corporation of Montreal has obtained a charter for the development of 250,000 h.p. at Carillon Falls, near Montreal. The Shawinigan Water and Power Company, which also has large developments in view, has obtained permission to increase its capital from $20,000,000 to $40,000,000.

Developments at Grand Falls

The New Brunswick government some time ago brought pressure to bear on the Grand Falls Company, Limited, which is controlled by the International Paper Company, to start the work of development of water power at Grand Falls in the county of Victoria, N. B. The company had agreed to spend $100,000 in actual bona fide development work at the Falls on or before January 10th. As no work had been done there was some talk of the government taking over the power rights from the company, but in view of the industrial depression prevailing the company was ultimately granted further extension of time.

Another water power development which seems likely to be undertaken in the near future is at the Grand Discharge, Lake St. John, where at least 1,000,000 horsepower awaits development. Control of these Falls has been obtained by a syndicate headed by Mr. Duke, president of the Imperial Tobacco Company, and it is understood that Sir William Price, president of Price Bros., is associated with him in the project. Last summer Mr. Duke and Sir William Price and others waited on Premier Taschereau in connection with a scheme for developing the Falls, and it is understood that as soon as industrial conditions warrant it the development may be undertaken.

The Bathurst Lumber Company of Bathurst has, during the year, completed the largest hydro-electric plant in the Maritime Provinces. This plant which is located at Nepisquit Falls in Restigouche County, was begun in May, 1919, and entailed an expenditure of $1,750,000.



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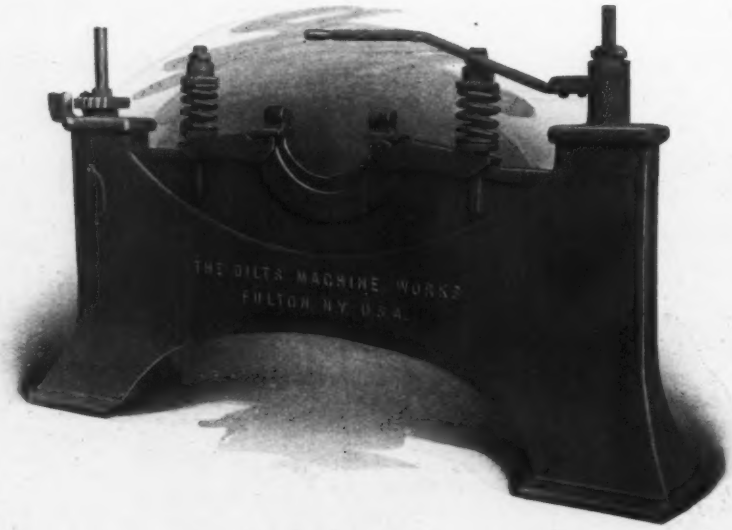

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A Year of Depression in Ontario

Period of Deflation Finds Many of the Producers Unprepared and Getting Things Down to Replacement Values Has Been the Chief Problem—Reductions During the Year Amount to Possibly 33 1/3 Per Cent. From the Peak Prices of Preceding Years—Greatest Recession Was in News Print Which Had Been Selling at $120 But Dropped to $70 Per Ton—Outlook Now Is Somewhat Brighter.

Written Especially for the Annual Number by G. B. Brock

Out of the hundred pulp and paper mills in Canada, forty are located in Ontario. They produce daily practically every grade and weight of paper consumed in the province. While the development of the industry has not been remarkable during the past year, owing to the depression and readjustment through which the trade passed, the majority of the plants were kept fairly well employed and emerged from the trying period much better than several other great enterprises.

Northern and Northwestern Ontario offers a very attractive field for the expansion of the industry and, during the past ten or fifteen years, there have sprung up flourishing pulp and paper towns, such as Iroquois Falls, Smooth Rock Falls, Dryden, Espanola, Kapuskasing and others. With the extension of the Temiskaming and Northern Ontario Railway, which is owned and operated by the province, to James Bay, extensive pulpwood resources will be available. The line is now being built to Tin Can portage, a distance of sixty miles north of Cochrane, the present terminus, and a rich spruce and balsam country will be tapped. The estimated amount of pulpwood available between Cochrane and James Bay is 138,000,000 cords, which is almost equal to the quantity in other parts of Ontario commercially accessible to existing transportation.

It is difficult to give an adequate conception of the number of cords of pulpwood available on the licensed and unlicensed Crown lands and the privately owned lands of the province. Authorities differ widely in their estimates, but, with the present rate of cutting, which ranges from 1,200,000 to 1,500,000 cords annually of spruce and balsam, it is conservatively predicted that the supply will last, at least, seventy-five years. A large proportion of the pulpwood cut from privately owned settlement lands in the process of clearing goes to the pulp and paper mills of Michigan, Ohio, Pennsylvania, Wisconsin and New York states. None of the pulpwood from Crown lands is, of course, exported, for years ago the provincial authorities placed an embargo on its export and, in all concessions that are put on the market, it is distinctly stipulated that the raw material must be converted into pulp or paper before leaving the confines of Ontario. All these facts are, however, well known and need no elaboration. The present provincial government has taken an active interest in reforestation, fire protection, and the pulp and paper development of Ontario and a number of limits have been thrown open to competition during the past twelve months.

1921 a Year of Depression

Conditions in the pulp and paper industry during the past year in Ontario were, to a large extent, similar to those which prevailed throughout the world. The year 1920 had been one of unexampled prosperity and abounding expansion. It was the greatest boom period in the history of the Canadian trade and every machine was operated to capacity and yet the requisitions of customers could not be adequately met. Toward the end of 1920 the far-seeing members of the industry began to take cognizance of the future and made preparations accordingly. With many concerns, however, the first rumblings of depression were heard too late, for the most sanguine members had loaded up with large stocks of raw material in the shape of pulpwood, pulp and other supplies. When the readjustment process set in, it was necessary to absorb the raw products before manufacturing costs could be reduced to a basis which would satisfy the consumers and at the same time prevent the mills from operating at a loss. The period of deflation found many producers unprepared for it, and to get things down to replacement values was the chief problem.

Early in the year prices began to fall, trade perceptibly declined, there was an absence of speculative buying, and everyone in the wholesale paper line started to unload as rapidly as possible. In some instances prices were badly cut and it looked for a while as if the entire market would be seriously shaken. However, the members of the Canadian Paper Trade Association took counsel among themselves and in the book, writing and wrapping paper line it was agreed that nothing was to be gained by panic or retreat. Jobbers began to study the new state of affairs and cut their garments according to the cloth, if one may use a sartorial expression, in connection with the paper industry. There were, of course, some price recessions in flat papers, but the market was not violently upset, and, on the whole, the reports presented at the annual meeting of the Canadian Paper Trade Association, held last fall, were of a satisfactory character and revealed what a spirit of unity and co-operation can achieve for the benefit and stabilization of the industry. Relations with the mills were maintained on an amicable basis and everything was done to create confidence in the future, and establish a better feeling through manufacturing, wholesale and consuming ranks. The reductions during the twelve months amounted possibly to 33⅓ per cent from the peak prices that had prevailed the year previous. The greatest recessions came in news print, which had been selling at $110 to $120, and before the end of 1921 had dropped to $70 per ton, and in some cases under this figure, the demand falling off markedly in the spring months. Several plants were idle for some weeks, owing to the strike of employees, who refused to take a substantial cut in wages. However, all troubles were ironed out in time and in June the mills began operations once more. Since then there has been a steadily growing call for print paper, and today practically all the producers are running their plants to capacity.

The outlook for the coming year is regarded as favorable, although possibly no one expects 1922 will be in any respect a record period in the general paper situation. The trend of events is, however, upward, and with each succeeding month the prospects grow increasingly bright. Manufacturing expenses have been cut to the utmost and all "frills" eliminated. The main thing has been to get operating and maintenance expenses down to a basis where the product of the plants could be turned out at a reasonable profit and interest paid on the bond issues and also the preferred and common stock.

It is true that the earnings of the majority of the large companies were considerably reduced, but, on the whole, they were

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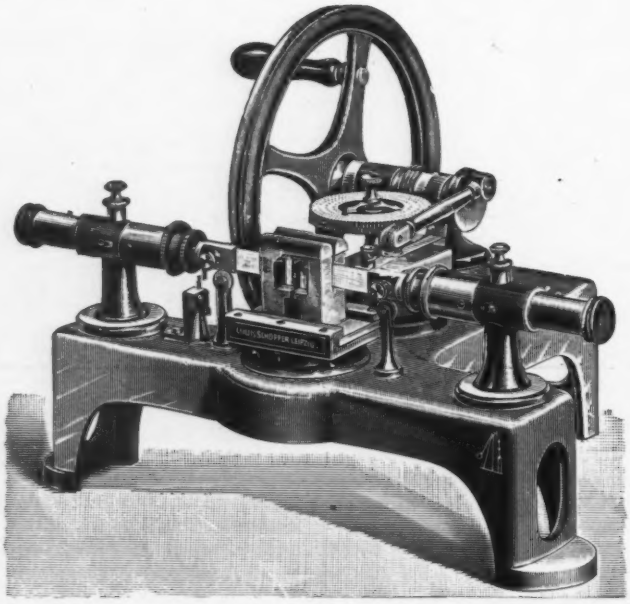

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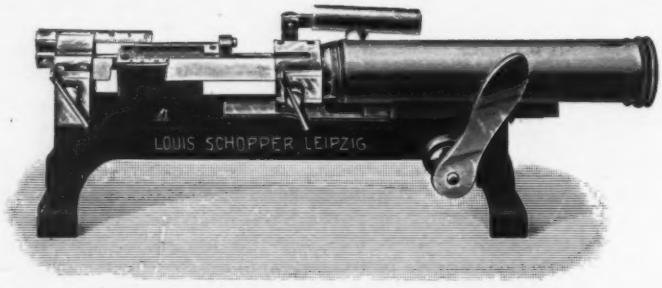
Schopper Strength and Stretch Tester



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more satisfactory than many had anticipated. The worst is now over and with greater labor efficiency, cheaper coal, low-priced groundwood and sulphite pulp, together with the anticipated reduction in the freight rates, the outlook is more encouraging. One or two concerns suspended the quarterly payment of dividends in order to conserve their resources, while others reduced the rate of interest. This was accepted with equanimity by the shareholders who had not lost faith in the future of the industry.

The wrapping paper trade was hard hit and a number of plants closed down for a time. Commercial conditions did not call for nearly the quantity that had been consumed in the previous year and in an effort to stimulate business there were several price reductions, which instead of increasing the volume of trade, as had been anticipated, had a reverse effect and caused buyers to hold back in the belief that quotations would go still lower. About September the last decreases were made, and since then buying has been carried on on a larger scale. The demand for kraft paper has greatly improved and January and February are reported to have been the best months experienced in a long time. Fiber papers have had a fairly good call during the past few weeks and the weakest spot has been with manilas, which seem to drag rather heavily so far as the average demand is concerned.

Pulpwood Concessions Disposed of

During the past year the Ontario Government disposed of three pulpwood concessions. The Nagagami limit in the district of Algoma was sold to the Transcontinental Development Company of Toronto, and, under the terms of the contract, the company agrees to spend one million dollars on a pulp plant within three years, the plant to have an output of 100 tons a day. A paper mill must be erected when and where ordered by the Minister of Lands and Forests. The Nagagami timber limit covers an area of 2,300 square miles and is estimated to contain two million cords of spruce pulpwood. Another contract, that of the Long Lake area in the district of Thunder Bay, was awarded by the Ontario Government to a company headed by J. H. Black, managing director of the Excelsior Life Insurance Company, Toronto. This limit consists of 3,400 square miles, and it is estimated there are between five and six million cords of spruce pulpwood in it. Mr. Black's company will have to observe the same conditions in reference to the construction of a pulp mill as applies to the Nagagami district.

The English River pulpwood limit was awarded to E. W. Backus, of the Fort Frances Pulp and Paper Company. It comprises over 3,000 square miles. Other pulpwood propositions may be thrown open during the coming year if the revival of the industry continues. Many small sawmill owners are erecting barking mills in order to handle rossed wood, for the majority of plants today will not purchase the product in the rough and a considerable saving is also effected in carrying charges.

During 1921 several improvements and extensions to plants in Ontario were carried out, but, of course, the development from a physical and productive standpoint was not nearly as great as in a normal year.

Fort William Paper Co. Started

In April last, the new 125-ton groundwood mill of the Fort William Paper Company started operations at Fort William. The plant consists of a slashing and barking room, grinder and wet machine rooms, which are fully equipped. All machinery is motor driven and power is supplied by the Kaministiquia Power Company. Most of the wood of the company, of which Col. Thomas Gibson, of Toronto is president, is cut on its own limits. The slasher and barker rooms handle about 300 cords of watered wood in twenty-four hours.

An addition was built to the wood room of the Mattagami Pulp and Paper Company at Smooth Rock Falls, Ont., and two drum barkers, 10x30 feet, installed by the Canadian Barking Drum Co. of Toronto. A third digester was put in operation, bringing the capacity of unbleached sulphite pulp up to 150 tons a day.

The Interlake Tissue Mills Company during the past year nearly trebled the output of its plant at Merritton by adding a second machine, 148 inches wide, as well as completing a new beater and stock rooms.

The Cornwall Pulp and Paper Company, whose plant is located at Cornwall, Ont., began operations and turns out groundwood pulp. The capital stock of the company was recently increased from $200,000 to $600,000 by the creation of 4,000 new shares of $100 each. The company was lately reorganized and it is expected will greatly extend its activities.

A new company was formed in Brampton, Ont., known as the Brampton Paste and Gum Company, which took over the paste and gum business formerly conducted by Gummed Papers. Flat gummed papers are now being manufactured at the plant of Gummed Papers, and one of the reasons for segregating the paste business was that more room was needed. E. R. Colbert is the manager of the newly organized Brampton Paste and Gum Company.

Specialty Bags, Limited, with a capital stock of $500,000 and headquarters in Toronto, was granted a charter to manufacture and deal in paper, cardboard, cartons, bags, boxes, etc. The new company took over the Specialty Paper Bag Company, on Geary avenue, and is enlarging the output considerably.

Abitibi Paper Co. Expansion

During the past year the news print capacity of the Abitibi Power and Paper Company at Iroquois Falls, Ont., was increased from 250 tons to 510 tons daily by the installation of three new news print machines, making it the largest news print plant on the continent under one roof. One of the machines is 158 inches in width, and is equipped with the Westinghouse synchronous electric drive, each unit having its own motor. Each of the units is wired into a master which keeps all parts of the machine running at practically the same speed. The Pusey-Jones Company of Wilmington, Del., supplied this paper machine, while two others, each of which is 232 inches wide, were built by Charles Walmsley & Co., of Bury, England, and are the largest news print machines in the world, each with a capacity of 98½ tons daily, at a speed of 700 feet per minute. Twenty-one additional grinders were placed in the pulp department and a new wrapping machine has been installed, with an output of thirty tons a day. Other extensions were also made to the plant, including a new grinder stone storehouse and a special slasher to handle four foot wood.

The Lincoln Paper Mills, of Merritton, made several improvements to their sulphite plant and began the manufacture of book, writing, envelope and sulphite bond papers in addition to their usual lines.

A new sulphite mill was completed by the Howard Smith Paper Mills, Limited, of Montreal, at Cornwall, Ont., which turns out seventy tons of bleached sulphite a day. An electrolytic bleach plant has also been installed, which will manufacture all the bleach that the company uses in its different divisions. Several changes were made to the machines of the paper mill, one being converted into a cylinder machine and another extended, with an eighty-foot wire. New lines of paper are being turned out including blotting in three grades, bristol board and filled blanks as well as deckle edge papers.

Great Lakes Paper Co. to Build Mill

The Great Lakes Pulp and Paper Company, of Fort William, which has the Pic River and Black Sturgeon River pulpwood concessions from the Ontario government, has entered into an agreement to erect a 100 ton news print mill within the next three years and will spend two million dollars in buildings and equipment. The location will be the Mission site in Fort William.

Thomas S. Woolings & Co., of Englehart, completed a new cutting-up and barking plant at Connaught Station on the railway

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line from Pourquois Junction to Timmins. The company is a large shipper of pulpwood from Northern Ontario and employs several hundred men in getting out its products. It was to increase production with a minimum of cost that the new plant was built. All the logs are 16 feet in length and are brought up and discharged on the slash table direct. Three 60 inch saws cut up the logs into 4 foot lengths which are then conveyed to two 10 foot diameter barking drums, each 30 feet long. The barked wood is conveyed to the piling grounds by cable conveyors, the main one of which will be 1,800 feet long. The haul-up and slasher are driven independently by motors, as is each conveyor and drum. The whole plant has been built on solid concrete foundations, and the boiler house is of steel construction throughout. The barked wood is shipped to Johnsonburg, Pa., to the Armstrong-Forest Company, which is the largest user of pulpwood from Northern Ontario. During the busy shipping season there is almost a trainload going forth across the line every day.

Fiber Boxes Limited, which company took over the business carried on by Fiber Boxes, on Sterling Road, Toronto, was granted a charter with a capital stock of $250,000. The concern manufactures and sells boxes, cases, and cartons made from paper, board, fiber and other materials.

The St. Thomas Boxes, Limited, of St. Thomas, Ont., intend installing several new machines and manufacturing shoe cartons and fancy boxes for Christmas gifts. W. H. Sweet is the manager of the plant and control of the establishments was secured recently by local capitalists.

During the year considerable improvements were made to the plants of the Canadian Paper Board Company at Campbellford and Frankford. At the latter place extensive repairs were made to the building and improvements to the machine and boilers. The output is about 30 tons of board daily. The total production of box, chip, straw and other lines of board by the Canadian Paper Board Company at its three plants is now over 100 tons daily.

A groundwood mill with a daily capacity of twenty tons was built at Frankford.

Spruce Falls Co. Project

The Spruce Falls Company, of Neenah, Wis., during the past year expended at Kapuskasing about $4,000,000 in the development of power, erecting a sawmill and building a sulphite pulp plant which has a capacity of 120 tons a day. This plant will be put in operation as soon as conditions in the pulp market improve and the demand grows more active. It is also the intention of the company to go ahead with the erection of a paper mill at a later date, while there will ultimately be a power plant development of about 100,000 horse power. When the pulp mill is in full swing, some 250 men will be engaged, while 400 or 500 more will find employment in the bush for several months in the year.

The Provincial Paper Mills Company of Toronto, during 1921, erected a new steam boiler plant at Mille Roches and an additional storeroom at Thorold, Ont. The company also carried out several improvements at its Port Arthur division by adding another boiler, sprinkler, tank and tower, and installed an extensive fire system for its woodpile. It also completed a water supply system of sufficient capacity to amply satisfy the present requirements of the company and the proposed book and wrapping mill which will likely be gone ahead with this year. Already the excavation work has been carried out. The building will be 900 feet long and capable of taking care of two machines.

The new pulp mill which will be erected at Kenora by E. W. Backus, president of the Fort Frances Pulp and Paper Company, which obtained from the Ontario Government the English pulpwood concessions, will have a capacity of 240 tons per day. The question of power is practically the controlling factor in the starting of the pulp mill which can be finished and ready for operation before it will be possible to complete the power plant.

The plant of the Dryden Pulp and Power Company at Dryden, Ont., after being shut down for some months, resumed operations early in the fall. The kraft pulp mill is now turning out about 70 tons and the paper mill some 20 tons of kraft sheathing and kraft wrapping papers. The mill has an ample supply of pulpwood for the coming season.

The Wilson-Munroe Company removed from 160 York street to its handsome and commodious new warehouse at 18-20 Duncan street, where three times the amount of floor space is available that the firm possessed in its former quarters.

Strathcona Paper Co. Improvements

The Strathcona Paper Company of Strathcona, Ont., has installed a four cylinder machine for the making of board. The machine has 82 inch trim, three granite press rolls, thirty-six 4 feet diameter dryers and two stacks of calenders and is run by a Brownell variable speed engine. The capacity is 30 tons a day of all kinds of board from 15 up to 60 point. The product consists of chip board, pulp board and solid news board, and there is being added an extra stuff chest and extra Jordans for the production of folding board and vat lined boards. The machine was built by the Dominion Engineering Works of Montreal and was put in operation in July last. The other machine is a single cylinder one with 72 inch trim and turns out building papers to the extent of 10 tons a day. The plant is operated by steam power, electric and water power and has excellent shipping facilities on the Canadian National Railway. W. J. and G. R. Findlay are at the head of the Strathcona Paper Company. The demand for building paper during the past three months has been very much improved owing to the active structural output.

The Kaministiquia Pulp and Paper Company's plant at Port Arthur, which has a capacity of 40 tons of groundwood daily and was closed down for many months, has resumed operations. The mill was purchased a few weeks ago by the Consolidated Power and Paper Company of Wisconsin Rapids, Wis., for $175,000.

Other Developments

During the fall, fire visited the plant of Gummed Papers Limited at Brampton, Ont., doing considerable damage. The machinery, however, was not injured and the plant was set in operation again a few weeks later. The mill turns out cloth-lined papers, stay papers, waterproof papers as well as gummed paper and cloth tapes.

The Temiskaming Pulp and Paper Company, whose head office is at Toronto, is completing the erection of a new groundwood pulp mill at Dixon Creek near Haileybury. The building is 270 feet long by 60 feet wide, the superstructure being of concrete and steel with interlocking tile brick walls and gypsum slate roof covered with Barrett roofing specifications. The output will be 40 tons a day and it is expected the mill, which is electrically driven, will be in operation early in the summer.

The Nipigon Fibre and Paper Company completed a new ground wood pulp plant at Nipigon, Ont., which began operation early in the spring. It is expected that the daily capacity will be increased from 50 tons to 100 tons. After this maximum is reached, the original plan of the company to erect a news print mill adjoining the pulp plant will likely be proceeded with.

During the year several improvements were made to the Kinleith Paper Mills at St. Catharines. The capacity of one machine was increased by about 30 per cent, the wire considerably lengthened, 12 additional dryers added as well as an extra press. The mill now has an output of about 25 tons a day of book and writing paper.

ESCANABA PAPER CO. RESUMES

The Escanaba Paper Company, employing about 400 hands, has resumed operations after being idle for about two months. Unemployment in Escanaba was acute before the reopening of the mill. It is said the company has sufficient orders to keep it in operation.

SALES

Tuesday, April 4th, 1922. One 164″ Thousand Foot Machine to Washington Pulp and Paper Company, Port Angeles, Washington.

Thursday, April 6th, 1922. One 164″ Thousand Foot Machine to Kalamazoo Vegetable Parchment Company, Kalamazoo, Michigan.

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Newfoundland's Paper Industry in 1921

Was Most Unsatisfactory Year for the Pulp and Paper Mills Established on the Island—Pulp Mill at Bishop's Falls Has Been Working Only About One-Quarter Time, But It Is Expected That Operations on a Full Scale Will Start Soon, When About 100 Tons of Pulp Will Be Turned Out — Big Pulp and Paper Mill May Be Erected on West Coast of Newfoundland With Outlet at the Bay of Islands.

Written Especially for the Annual Number by P. T. McGrath

The year 1921 was a most unsatisfactory one for the pulp and paper concerns established in this Island. Of these there are still only two in actual operation—the Anglo Newfoundland Development (Northcliffe) Company, making paper at Grand Falls; and the Albert Reed Company, making pulp at Bishop's Falls, ten miles distant; and it may be explained, in passing, that, as a result of transfers of stock recently, the latter concern has now become virtually a subsidiary of the former. The Terra Nova pulp and sulphite plant at Glovertown, largely promoted by Norwegian capital, is yet in the preparatory stage, its building operations not being complete, or likely to reach that stage before next fall, while the Norwood Company's pulp mill at Horwood, on the east coast, an enterprise promoted with local capital, has been idle for three or four years, due to its dam going out as a result of a flood, and no renewal being made since.

The world depression affected every other industry in this colony last year and the making of pulp and paper did not escape. Depression began with the opening of the year, attempts to enforce a wage cut brought about the inevitable strike during the summer, and then the introduction of cheaper-made paper and pulp from Continential Europe later in the season, threatened a shut-down or a partial suspension towards the end of the year, though this however, has been fortunately averted thus far.

Operations of Grand Falls

At Grand Falls during the first three months of 1921 the company had about two thousand men in the forests, for the annual wood-cut, which began in the previous November; and a cut of 160,000 cords was made in five months, considered a very satisfactory outcome in view of the tempestuous character of the winter, which was unusually severe. The normal need of the plant being about 120,000 cords, the company was able to put up a reserve of 40,000 cords; which it was glad to do, because owing to various difficulties for two or three years previously—the scarcity of men during closing period of the war, the abundance of money in the next year or two, whereby men would not engage in wood cutting, and the easier employment elsewhere—the reserve was exhausted and the obligation to create a new one had become imperative.

The mills at Grand Falls were run at full capacity during January, February and March, producing 200 tons a day, but in April, owing to a reduced demand, the working time was cut to five days a week. On May 1 a proposed reduction of wages was announced and the men went on strike, remaining out for three months, as happened with the mills in the United States and Canada. Early in August an agreement to resume was effected, the men accepting a reduction of virtually 25 per cent, or about the same as that arranged for American and Canadian mills. From then until December full time was resumed, but it was feared that with the opening of 1922 there would have to be some curtailment, as it was claimed by the company that owing to the high costs of labor, material, etc., paper could not be produced as cheaply as in Europe. The average working force is about 1,000 men, rising to 1,200 in the summer time, when additional workers have to be taken on to handle the logs in the rivers, and dropping to about 800 in the winter, when only the actual mill operators are needed, and outside work is suspended. The operations of this company have resulted in the creation of a town of 4,000 people on a site where there was not a human habitation fifteen years ago, and if contemplated additions are made in the next few years to further enlarge the plant, it will probably become the second town in the Island, ranking after St. John's, the capital.

A Small Reduction Made in Fall

A small reduction in the full capacity of the plant was enforced during the autumn. The sulphite plant, which, if worked to full capacity, can produce 100 tons a day of this material, in addition to what is required in the making of the news print paper, was not worked to produce excess of this product, because the British market was flooded with stocks from Sweden and Finland, sold at prices this mill could not meet. In another direction curtailment also became obligatory this winter—in the wood-cutting campaign that began last November. The company has only 500 men in the woods this winter against 2,000 men last year, having found, when the mills resumed in August, that there was an available supply for twenty months. Even now they are cutting 10,000 cords more than are commercially necessary—to help out the Newfoundland Government in its unemployment problem, which, of course, is a serious one this winter as it is elsewhere throughout the world. But this was the utmost that could be done by the company, because it was uncertain if the mills would operate fully during the winter, owing to competition from other quarters. One reason why the Grand Falls paper is higher in price than some competing products in Europe is that last spring, owing to the high cost of coal and other supplies assembled at the mills in large quantities, fearing a shortage through the British coal strike, the plant is stocked with materials higher in price than many smaller concerns paid elsewhere and is thus faced with the contingency of operating at a loss temporarily. The management would like, in the interest of the workingmen, to see the plant going on a full scale all winter, but while it continued this rate for January and February, 1922, it is feared that halfway through March or at the beginning of April there will have to be a curtailment made. The cost of living at the mill dropped some ten per cent between May and November and is now about sixty per cent above pre-war figures, and the wages of the men are adjusted as nearly as possible to the cost of living; but it is recognized that if the plant is to continue in competition with outside concerns wages and other costs must be revised so as to meet such competition effectually.

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Working One-Quarter Time at Bishop's Falls

The pulp mill at Bishop's Falls is working this winter at about one-quarter its capacity, as the problem of shipping in winter in Newfoundland is not a simple one, but by April it is expected to operate on a full scale, which is at the rate of about 100 tons a day of groundwood pulp. This mill also had a goodly stock of wood on hand and is only employing about 150 men in the forests this winter. It suffers, like the Grand Falls plant, from the fact that prices in foreign markets under-cut it at the present time.

Paper Mills at Grand Falls to Be Enlarged

Plans have been prepared for an enlargement of the paper mills at Grand Falls to enable them to increase their output by fifty per cent and the idea is that when the enlargement is effected the pulp produced at Bishop's Falls will be used at Grand Falls in the manufacture of news print paper, a plan which will ensure the absorption of much of the output of sulphite pulp, which at present remains at an excess and this has to be exported, or else that portion of the plant has to be shut down. But this enlargement will not be undertaken until prices of materials, labor, etc., drop more nearly to pre-war prices than at present, and in the meantime, of course, the uncertain condition of operations at these plants makes it hard for the working men engaged, who have no assurance of continued employment.

A feature of the proposed enlargement will be the providing of increased water power. At the present time the demands of the mills and of the town are met with an electric energy of 25,000 horse-power, but another 15,000 can be raised by adding storage dams and adopting other measures for conserving the flow of the Exploits River and Red Indian Lake, from which the water is obtained. Thus far it has not been necessary to take any such steps, but for a further extension of the mills this will be required. Possibly if wage and other prices can be reduced sufficiently this enlargement will be undertaken within the next year or two, but obviously no commercial enterprise will attempt such an extension while these costs are such as to make it impossible to sell the manufactured products at a profit.

At the Gloverstown plant the buildings are up and roofed in and the machinery is now being erected. It is proposed to make sulphite only and ship about 300,000 tons a year, or much the same quantity as Bishop's Falls makes of groundwood pulp. This Glovertown mill had already available what wood is needed for the manufacturing that will be done next fall and winter; and will then start cutting the stock for further operations.

Nothing Done About Starting Horwood Mill

Nothing has been given out latterly as to the prospect of the Horwood mill resuming the manufacture of groundwood pulp at an early date, but seeing that the other mills are finding it difficult to turn out their products at a paying figure, it is doubtful if this concern will attempt any revival of work in the near future.

Suspends Law Forbidding Export of Wood

During last winter, and again this winter, because of the low prices for fish, the slackening of work in the iron mines and lumbering woods, and the depression of other industries of the country, the Newfoundland Government decided to suspend the law which forbids the export of pulpwood, and to permit the cutting of this throughout the country as a relief measure. Consequently some 50,000 cords were cut last year and contracts made for perhaps three times that quantity the present time, though whether all of this will be cut or not, is somewhat doubtful at present. The plan under which this work has been done is that the government has guaranteed certain prices for the material, sufficient to give reasonable remuneration to those engaged if their condition is one of distress, but to restrain others from embarking upon it if they think they can do better in other directions. Difficulties have been met in marketing this product abroad, either as pulpwood or as pitwood for mines, and it may be that within the next year a lot of it will be unsold, in which case it will probably come into the hands of papermakers and thus enable them to get their raw material at a figure which will render it easier to produce paper at a paying price. For instance, the mills at Grand Falls have agreed to take 10,000 to 20,000 cords of pulpwood at $7.50 delivered at Grand Falls, which means that the men who cut it will get about $5 a cord, a figure at which they will do very well, according to local judgments.

Likely to Become Larger Producer of Pulp

An encouraging circumstance with regard to the future of the pulp and paper industries in Newfoundland and the Maritime Provinces of Canada is found in the fact that according to forestry experts in Upper Canada it is being found that Ontario and Quebec forest areas which have been cut over for pulp do not reproduce themselves with the spruce which is so essential, and that it will become necessary in the not-distant future to look elsewhere for supplies or to re-seed these tracts. In New Brunswick and Nova Scotia, on the other hand, and also in Newfoundland, it is found that cut-over ground does reproduce and with reasonable rapidity. Thus there is cause to think that Newfoundland can in the years to come be made even more important as a reproducer of pulp than at present, if the Colonial Government will adopt a policy of re-seeding the tracts that have been de-forested. It takes about sixty years for a seeding to mature, or about 40 from the time the ground is cut-over, as the saplings are from ten to twenty years old at that time; and it is being argued that no time should be lost in preparing to meet conditions in the future when a greatly increased demand will be made on the forest areas of this Island.

To Develop Forest Areas

At various times during recent years projects have been discussed for the development of forest areas on the West Coast of Newfoundland, with an outlet at Bay of Islands, midway up that seaboard; but they have come to nothing. During last fall, though, another scheme was launched, more promising in the opinion of its promoters, than any yet outlined. It is backed by the Reid Newfoundland Company, which operates the Island's system of railways, and of which the Newfoundland Products Corporation and Mines and Forests (Newfoundland) Limited are subsidiaries, and Armstrong, Whitworth & Co., of London, England, a firm with a world wide reputation for the construction of large engineering enterprises. The salient features of this scheme can best be described in the following statement issued by these firms:

"Sir W. G. Armstrong, Whitworth & Co. have been asked by the directors of the Newfoundland Products Corporation and Mines and Forests (Newfoundland) Limited, the owners of the Humber River water-power rights, certain lands adjacent to the rivers and certain timber limits, to act as their technical advisers in the development of the natural resources of their properties and to co-operate with them in the management of the industries to be established, and an agreement has been entered into, whereby Armstrong, Whitworth & Co. undertake to act in this capacity.

"During the past season, the new scheme for the development of the Humber River has been surveyed by the Reid Company's engineers. The plans of these surveys were, during the autumn, submitted to the engineering staff of the Armstrong, Whitworth & Co., who made an estimate of the cost of development of this water-power. Within the past month engineers from the above company have gone over, checked and proved those surveys.

"This development consists of 150,000 H. P. from the Junction Brook flow. A further development of 60,000 H. P. can be added at the same site, by using the waters of the Upper Humber. And a further quantity of 25,000 H. P. can be developed from smaller streams in the immediate vicinity, and transmitted to this site at the head of Deer Lake; making a total possible development of 235,000 H. P.

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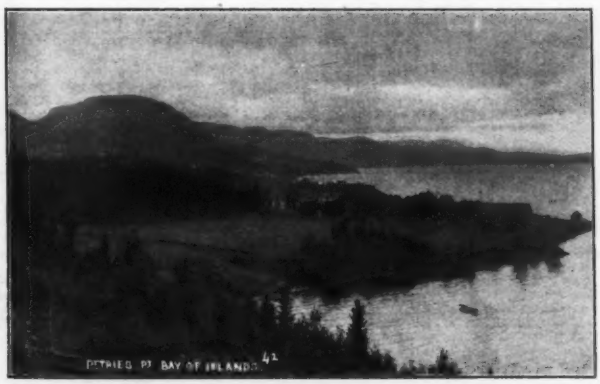
Cheap Power

"The estimated average cost of this whole development will not exceed $60.00 per H. P. This is a remarkably low figure, as is shown by comparing it with other similar undertakings, the cost of which is as high as $300.00 per H. P. The average for all Hydro-electric schemes in Canada is $217.00 per H. P. The various industries for which cheap power is either essential or of great importance were studied, taking into account all the local conditions and the resources of the country. As a result of this study it was found that the pulp and paper business would be the most suitable for the first industry and a very thorough study of this was made in co-operation with the technical directors of Chas. Walmsley & Co., of Bury, Lancashire, England, one of the best known paper experts of Great Britain and with a world wide experience in paper making. The construction of a pulp and paper mill, utilizing about 85,000 H. P. and producing 400 tons of news print per day, has been decided upon. Of this power 25,000 H. P. will be required by the pulp grinders and paper making machinery, and 60,000 H. P. will be used for raising the necessary steam for drying the paper, producing sulphite pulp and heating. This method of operation will be cheaper than coal, and at the same time will make the mill independent of all supplies of outside coal.

"The timber limits have been carefully cruised by competent men, under the direction of J. P. Powell, C. E., superintendent engineer of the Reid Newfoundland Company. The amount of wood available is estimated to be 10,500,000 cords; and as the quantity required is 220,000 cords per annum, there is enough wood on these limits to supply the mill, at the proposed capacity for 50 years, without considering natural growth during this period. This only represents about one-third of the timber available on the west coast, so that the supply of timber is beyond question.

"Armstrong, Whitworth & Co., will take a contract to supply all the machinery and equipment for the whole power development and the pulp and paper mill at a firm price; execute the work on the site, construct and erect on a cost plus percentage basis, so that the undertaking will benefit from any reduction in the prices of all materials used in construction as the work progresses.



WHERE SHIPPING PIERS WILL BE BUILT AT BAY ISLANDS

"On that basis, it is estimated that the cost of the whole development, including working capital, will not exceed $4,000,000, the estimated capital cost for the first 85,000 H. P. to be used for the manufacturing paper, worked out at the rate of $77.00 per H. P. which is a very low figure. Included in this figure is the cost of storage, dams, canal, controlling and intake dams for the whole development.

"The estimated cost of producing paper at this plant is $40.00 per ton, with rough wood costing $6.00 per cord at the mill. This cost of making paper is based on the most reliable and recent information in the most up-to-date Canadian mills, where conditions most nearly approximate those of the proposed new undertaking. This figure will prove to be a conservative estimate.

"It will be necessary to issue bonds to the value of $3,000,000 at the start, but to have an authorized issue of $4,000,000 the balance of which could be used if and when required. During the construction period, that is, until the mill is in operation, the interest and sinking fund will be charged against the cost of construction and paid out of the money raised by the issue of the bonds.

BAY OF ISLANDS SHIPPING POINT FOR PROPOSED NEW PAPER MAKING ENTERPRISE

"The fixed charges, interest and sinking fund, at 6 per cent, and 1 per cent respectively come to $1,080,000, provided that the full $4,000,000 be issued (taking the pound as $4.50), so that the earnings, conservatively estimated, more than twice cover the fixed charges.

"The construction work will mean the spending of $7,000,000 in Newfoundland on labor and local material in two years.

"At least 50 per cent of the cost of production of a ton of paper is paid in labor, $20.00 per ton on a production of 120,000 tons, would be $2,500,000 paid annually in labor.

"Added to this will be the earnings of the people, in and around the town, who will not be in direct pay of the paper company.

"The paper town will be situated at the head of Deer Lake, surrounded by the largest area of the best agricultural land in Newfoundland, which eventually should be producing meat and vegetables enough to supply the town demand.

"These three items combined will make the labor figure paid, directly and indirectly by this project, not less than $3,000,000 annually."

Scheme May Be Postponed

The foregoing is the official statement regarding the proposed enterprise, which, as outlined above, appealed very strongly to the people of Newfoundland. But it was intimated that the promoters would expect to have a guarantee by the Government of principal and interest, which would mean, possibly, a very serious burden for the country. The idea with regard to financing the project was that the money would be raised at six per cent and that there would be another one per cent set outside annually to provide a sinking fund to pay the investors in the bonds, which amount would enable this payment to be made at the end of thirty-seven years. For the country, therefore, was the contingency that, if the project did not work out as indicated, it might be called upon to pay a sum of $1,260,000 annually for that period, estimating a £1 at $4.50, which is about its present worth. The existing public debt of Newfoundland is about $50,000,000, and it is understood that a further loan of $5,000,000 for general public purposes is to be raised this year, making $5,000,000 in all.

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1921 One of Worst in French Paper Industry

Importations at Ridiculously Low Prices the Principal Cause for Stagnation in the Industry—Beside Lack of Demand, However, French Paper Manufacturers Also Found Themselves Facing Financial Difficulties of More Than Usual Difficulty—While the Market Showed More Activity in September, It Has Since Slowed Down Because of Increasing Prices—Present Situation Is Still Uncertain.

Written Especially for the Annual Number of the Paper Trade Journal by Our Regular Correspondent

The year 1921 has undoubtedly been one of the worst in the history of French paper.

Sellers and buyers had to face innumerable difficulties, which had been brought about by passing from a state of war to a state of peace.

During the war, and even for a certain length of time after hostilities had ceased, French paper manufacturers had to buy their raw material, either abroad or at home, at such high prices that they may well be qualified as ridiculous. Metal cloth, felts, belts, charges and coloring matter had reached fantastic prices, and these materials came for the greater part from the interior.

What can be said as regards paper pulp and the various machines and apparatus derived almost exclusively from abroad?

Chemical pulp had increased by 1,300 per cent; mechanical pulp by 1,400; metal cloth by 1,000, coloring matter 2,000 and certain kinds, for example, auramine, by 3,500 per cent.

French paper factories had to meet alone the requirements of the country, estimated at the rate of 15 kilos of paper per year per inhabitant. To this figure, which is certainly below the true figures, must be added the enormous waste of the army, the intensive correspondence of the allied troops fighting on French soil, that of prisoners of war, of the troops of the army of the East, etc.

After the armistice, the large orders of the army ceased suddenly; the allied troops returned home, and Sweden, Finland and America, after the submarine and mine danger was over, began sending us paper again, and tried to make up for lost time.

The press, which had been misinformed as to the reasons for the increased price of French paper and which claimed it had to put up with all sorts of trouble with the manufacturers, through a regrettable desire for retaliation and without paying any heed to the future of the French industry, which it was endangering, did not hesitate to place very important orders abroad.

The government of the Republic tried several times to limit or prohibit the importation of news paper, but in view of the threatening attitude of certain periodicals, and in order to avoid even more serious conflicts, it was obliged to allow importation of printing paper, and tax it with a very low customs duty.

In this way, in the guise of paper destined for the press and for printing, large quantities of all sorts of paper were able to enter France freely and were used for all kinds of purposes. In this connection may be cited the instance of a large importing firm, which introduced into France paper supposed to be for the press and publishers, but cut it up and sold it in various sizes.

Such are the causes of the great crisis of the French paper industry, which started about the middle of 1920 and lasted until the middle of 1921, diminishing during July of last year, and which has been threatening to begin again ever since the second half of December.

The Beginning of 1921

At the beginning of 1921, the large factories which had started remodeling their plants or adding to them, continuing the work, in the hope of a possible improvement on the one hand, and on the other, in order to maintain the technical staff which had stayed with them, found it necessary to send their employees and workmen away, who had been engaged during the war to fill the enormous gaps caused by casualties, or to study and carry out their new building operations.

Unemployment in the paper industry followed, and increased the ranks of the unemployed in the metal and textile trades, and the benefit societies began to be anxious when they saw their constantly increasing number of unemployed. Fortunately, there was a certain respite in the general crisis towards the middle of the year, and the number of unemployed of all classes which had reached 90,000 approximately, dwindled down to about 10,000 at the end of November.

However, it should be remembered that a large number of workers returned to the country of their origin and that the incoming foreigners in France were watched very closely. This contributed largely to bringing the number of unemployed down to a normal figure.

The principal cause for the lack of sales of French paper was the purchase abroad of a large quantity of news paper. At one time, importation of foreign news paper was so important that one began to wonder whether the French paper industry was not moribund.

The press, which had to pay a high price for paper during the war, completely abandoned the home product.

Besides the lack of sales, the French paper men found themselves facing financial difficulties of exceptional gravity.

The large banking institutions, which used to discount drafts willingly, and advanced a good deal of money on stocks of pulp and other stocks, in view of the extraordinary decrease in prices, and in order to avoid unpleasant surprises, have refused all credit to the industry.

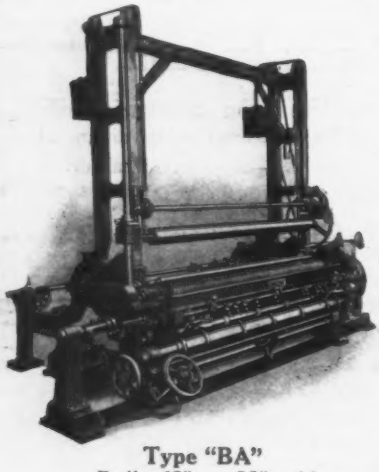
The buyers, who during the time of the war and even for some time after the Armistice, used to pay for their goods cash down, began to ask for 90 days or even more, while the dealers in wood pulp asked for payment with the order or at the latest upon delivery.

Another very great difficulty has been the drought. Last winter there was no heavy snow fall, and every river has diminished enormously, while torrents have completely dried up.

Just at the time the situation was improving and factories were beginning to receive orders, a great number of small paper factories were unable to manufacture for lack of water. Those that continued in spite of everything, and used power produced by steam, gasoline motors or other means, were obliged to increase their prices. Hence, decreased orders and a return to the precarious conditions that preceded.

Large and even small factories were using their old stock, and could not or would not buy raw material, and especially mechanical

The New Langston Slitter and Winder



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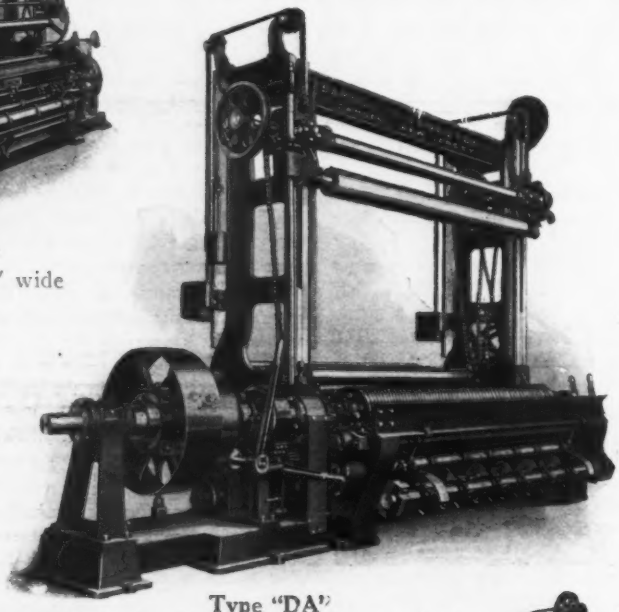

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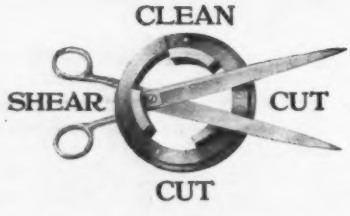

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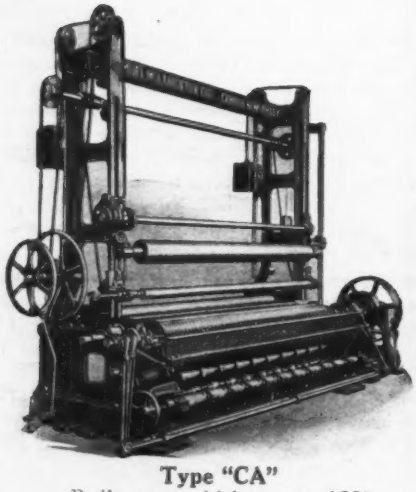

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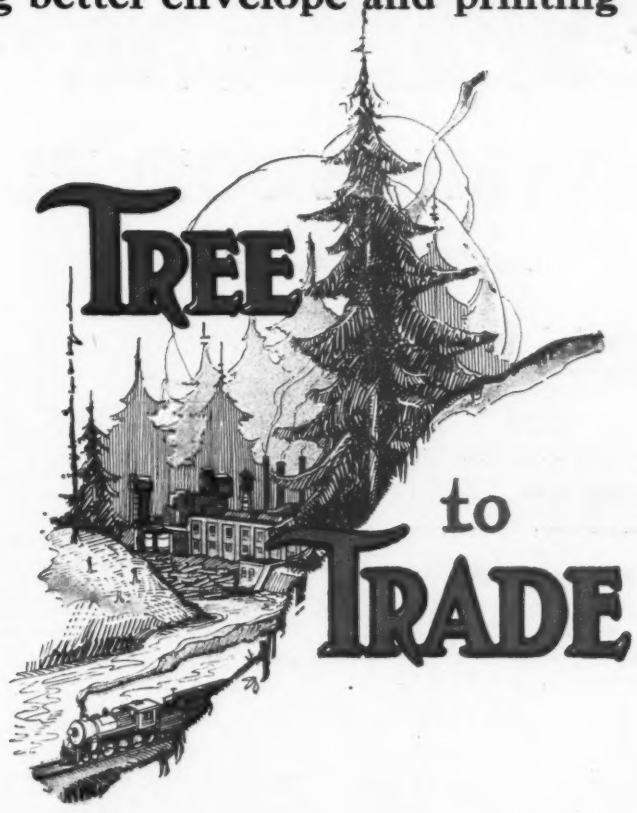

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SWEDISH WOOD PULP

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pulp, when Scandinavia, in view of slack sales, offered it at prices that were low compared with all the other articles needed for paper manufacture.

The drought in Scandinavia and Germany contributed to the diminishing of stocks, that were already reduced through strikes and slow production during the period of acute crisis, and wood pulp again went up in an ascending scale that was anxiously followed. It is only recently that a certain easier tone has been noticed in prices, but it cannot be stated positively whether this is the beginning of lower prices. The price of paper, therefore, is not in keeping with that of raw material, and even now, factories are producing at a loss.

The paper market took on great activity in September; and this kept on progressing until the middle of December. At present, the contrary is taking place; since then, the slowing down of orders, especially for the standard kinds, is constantly increasing. What are the causes for this? They are to be found in the increase of prices. Manufacturers, rightly or wrongly, as soon as orders came in, suddenly increased their prices, and, of course this has brought about dwindling sales.

It must also be borne in mind that Scandinavia still has paper stocks, and will miss no opportunity to send us its goods.

The table that follows will give an idea of the fluctuation of prices during the year 1921. As will clearly be seen, prices for nearly every kind have a tendency to increase.

PRICE OF PAPER DURING 1921

Paper	*January*	*June*	*December*
Letter tissue ..... Frs.	700	550	500
Register, extra (Ledger)	550	450	450
Register, superior (Ledger)	450	330	330
Ledger, standard	420	300	300
White blotting	325	270	270
Colored blotting	310	260	260
White Glacé, average	300	220	210
White Poster	275	175	180
Golden Rust	230	140	176
Kraft	325	200	230
Wrapping paper	160	80	115
Straw	75	70	85
Grey Cardboard	120	80	115
Ordinary writing paper	275	190	200
Unbleached crystal, 30 gr.	650	375	400
Unbleached sulphurated-smili	400	230	270
Sulphurated	650	450	450
Newspaper, satin, in reams	250	150	160
Newspaper, satin, on spools	225	130	140
Newspaper finished, on spools	210	125	125
Ordinary coated paper	320	290	250
Superior coated paper	500	440	380
Paper for Railroads	275	150	175
Wood pulp cardboard	135	95	130

All eyes and all hopes are at present centered on the new alfalfa pulp factory which will free in a large measure French manufacturers from the importation of foreign pulps.

The company exploiting this material, which is extremely important for the manufacture of fine papers, signed several months ago, a lease for a part of the land and plants of the National Powder Factory of Sorgues, near Avignon.

The principal substance that will be treated is alfalfa, but the plant is equipped in such a way as to treat also other vegetable fibers such as straw, broom, reeds, etc.

Alfalfa will not be wanting, for it is well known that in spite of the large English consumption, an enormous proportion of the alfalfa resources of North Africa remains unemployed.

It appears, from well authenticated official statistics, that the annual production of alfalfa in North Africa can amount to 600,000 to 700,000 tons, and export has never exceeded 120,000 tons. So the French market can be well supplied, and it will then be able to free itself from the necessity of ordering foreign pulps, with their fluctuations subject to the rate of exchange.

We have been dealing with the conditions of the French market in general. We shall now examine the situation as regards the manufacture and industry of the various kinds employed in France.

News Print

There has been talk of news print being sold at 100 frs. per 100 kilos and even 90. If these prices have been quoted on a few lots of poor quality of foreign origin, on the other hand, French paper has never been sold below 110 frs. f. o. b. Paris.

At the present time, the price of news print varies from 130 to 140 frs. for paper prepared on spools, and 140 to 150 for paper prepared in reams.

French news print is undoubtedly better than imported paper, and for this reason publishers prefer French paper, even when there is a considerable difference in price.

One of the main reasons for the high price of paper is due to the rate of exchange. Because of this, we pay for pulp at very high prices, but when exchange becomes stabilized, it is hoped that news print of French manufacture will be at a reasonable price.

Ever since the large Paris and provincial dailies have returned to pre-war six-page issues, consumption has increased considerably, and of course this consumption has been felt in the price of paper.

Printing Paper in General

The consumption of printing paper, for the finer kinds and for the ordinary kinds, is still far below pre-war days. A war has been waging recently between paper manufacturers and printers on the high cost of books, which prevents their sale in France and abroad. Both sides think the other responsible for this state of affairs. We have proved that the reason for the high price of books is not to be laid at the door of the paper manufacturers, but at that of the publishers, and above all, certain dishonest speculators who are making scandalous profits.

In a 7 franc book, on an average there is less than a franc's worth of paper, so it is absurd to make the French paper manufacturers responsible for the high cost of French books.

Writing, Ledger, Drawing and Blotting Paper Made of Rags

Consumption of these papers is almost normal and prices have a tendency to increase. As in spite of poor sales, white rags are still rather high as compared with pre-war prices, the price on these varieties cannot go down yet. On the other hand, factories making rag paper are nearly all located on the bank of a river, from which they derive their power, and as many rivers have a diminished flow, production is limited. Again, it is not easy to procure these kinds abroad, on account of the comparatively high customs duty.

Wrapping Paper Made from Old Paper, Strawpaper and Cardboard

The production of these kinds is also handicapped because of the lack of water, because the factories are located most of them near torrents that have dried up.

The demand for wrapping paper is stagnant, but it is hoped that this will not last long.

Cardboard is greatly in demand in spite of its rather high price. Grey cardboard is quoted at 85 frs. and there is talk of increasing the price.

Cigarette Paper

The cigarette paper market was perhaps the last to feel the slump of the other kinds, but another factor has made its sale difficult, namely, Italian competition on export markets. Italy has had its plants increased through the annexation of the Irredenta lands.

Now, Italian cigarette paper manufacturers are keen competitors of the French manufacturers, especially on the Oriental markets, where the former are undoubtedly in a better position.

And yet French cigarette paper factories are not numerous and it would be easy with a little good will and concessions on both sides to come to an understanding and regulate selling zones and the question of prices. Everyone would find this a benefit.

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Paper Prices in Germany Show Big Fluctuation

Decline, Which Began in 1920, Continues During 1921 Until September—Prices Become So Low That Buyers From Many Foreign Countries With High Exchange Are Attracted to the German Market—Americans Largely Represented Among the Foreign Representatives—Almost All Branches of the Paper Industry Hold Conventions Which Fix Prices—Manufacturers of Paper Mill Machinery Busy.

Written Especially for the Annual Number by Sigismund Ferenczi, Editor *Papier Zeitung*.

The fluctuations of the paper market in Germany have probably never before been as unusual as in the past year. It became obvious that the trade is most interdependent on domestic and foreign politics and on the business situation throughout the whole world.

In order to get a clear understanding of the events of the year in question, we must give a glance to the happenings of the foregoing year. At the beginning of 1920 paper was scarce and the prices rose by leaps and bounds. The blockade had ceased and foreigners began to buy, as the mark had already dropped so much that exportation became profitable. At the same time the production of the mills was handicapped by lack of coal and cars, as both had to be delivered at first to France and Belgium according to the stipulations of the Peace Treaty. So the price of paper more than doubled from November, 1919, to January, 1920. This movement went on till the end of April, 1920, at which time the price was about four times as high as at the end of 1919 and about 43 times as high as before the war. As long as this wave lasted, jobbers and converters bought as much as they could get and mostly overbought themselves. At this time the lowering of the prices of all commodities in England, America and other countries with high exchange led to the so-called "buyers' strike" in those countries, and one consequence of this was the lessening of the demand for German paper. The paper makers made their offers to the home customers at somewhat lower prices and shorter terms. As soon as the customers were aware of this change, they strictly withheld from buying, and in June, 1920, many paper and board mills were compelled to operate on short time. This bad state of affairs lasted to the end of 1920.

Ups and Downs of Paper Prices

The ups and downs of the paper prices in general in 1920 may be seen by taking as an example the prices of a hard sized white wood free writing paper from pure bleached sulphite, the pre-war price of which was 0.58 mark a kilogram (2.2 pounds). This per kilogram was as follows: January, 1920, 13 marks; March, 1920, 19 marks; April, 1920, 25 marks; July, 1920, 20 marks; September, 1920, 16½ marks; October, 1920, 13 marks.

The slump continued in 1921 and the wave did not turn until September. Then the effects of the London conference of the leading Allies became obvious. At this conference the German government was compelled to subscribe to the obligation to pay in short terms a thousand millions of marks in gold. The first rate of 300 millions in gold has been paid in August, and the buying of foreign money in this amount weakened the German currency so much, that from the beginning of September to about November 15 the price of the dollar rose from 80 to 330 marks. German paper prices by this time became so ridiculously low to foreign buyers that many of them came over from countries with high exchange and bought as much as they could get. A sudden rise of the paper prices was the natural consequence, as the follow shows, the prices being of the same kind of paper per kilogram, as above: January, 1921, 12 marks; May, 1921, 11 marks; September, 1921, 9½ marks; end of December, 1921, 20 marks.

The prices quoted here are home prices. The export prices are and have been since the ceasing of the blockade substantially different and higher.

Export Control of Paper Trade

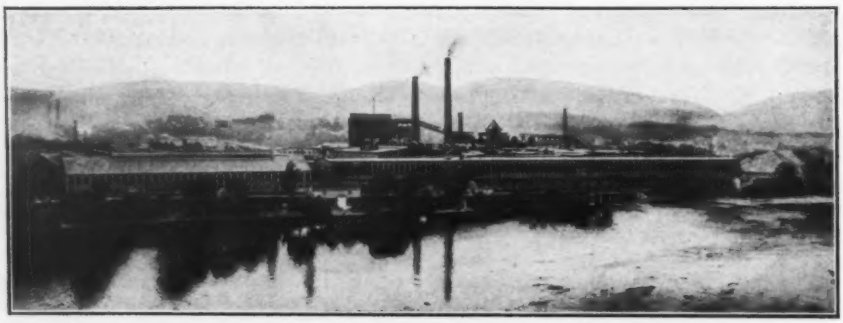
The nature of the export control in the German paper trade and the reasons for it have been made clear to the foreign business man in the World Number of the *Papier-Zeitung* of February 4, in four languages by Mr. Pfundtner, government's commissioner at the Foreign Trade Bureau for the Paper Trade. As he said there, "Germany has been compelled to subject its foreign trade to a rigid control by the government. The unfavorable financial situation and the heavy burdens imposed by the Treaty of Peace made it necessary to regulate imports and exports in such manner, that on one hand the home supply and accordingly the employment of German labor be ensured and on the other that the German exporter be made to make such export prices that the charge of dumping could not be made against them by foreign countries, but which at the same time would procure as much foreign exchange as possible for the payment of the reparation labilities. For the purpose of exercising this governmental control special foreign trade bureaus were intrusted with the supervision. These bureaus were not of a purely governmental form, but they included the interested industrial and commercial circles and also representatives of the workmen.

"For the paper trade, which comprises the products of chemical and mechanical pulp and of paper, including the printing and publishing trades, the foreign trade control is in the hands of the Foreign Trade Bureau for the Paper Trade, Neue Grolmanstr. 5/6, Berlin-Charlottenburg, and of its branch offices. The Foreign Trade Bureau for the Paper Trade also grants import and export licenses for mechanical and chemical wood pulp. Every application for an import or export permit must be accompanied by samples of the goods in question, together with documentary evidence of the prices.

"Of late the Foreign Trade Bureaus for the different trades, also for the paper trading, have begun, by order of the government, to compel exporters, who are shipping their goods to countries with high exchange, to make their quotations and sales in foreign currency, so that payment must be effected in foreign exchange. The government has been forced to this departure by the depreciation of the mark and the burden of the reparation liabilities, as the Allied Powers have given to understand in an unmistakable way that they will collect the 26 per cent export tax on every single export transaction, if Germany is not in a position to obtain the required sum in high exchange in some way or other."

Export Prices Higher Than Domestic

The export prices are higher than the home prices. Almost all branches of the paper manufacturers and converters have their conventions which fix the prices, and committees of these conventions



OXFORD PAPER COMPANY

CAPACITY OF MILL, 300 TONS OF PAPER PER DAY

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MANUFACTURERS OF

High Grade Machine Finish and Super-Calendered Book, Lithograph, Envelope and Tablet Papers

Soda Pulp 150 Tons Per Day

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MAINE COATED DIVISION

MANUFACTURERS OF

Polar, Hi-tone and North Star Coated Book Papers

ALSO

Covers, Lithograph and All Grades of Coated One and Two-Side Papers

gather from time to time to revise these prices according to the changes of the manufacturing conditions. The export prices must often be revised also according to the exchange values and the business conditions in the foreign countries. The government's commissioner at the Export Bureau for Paper assists at these deliberations of the committees. His bureau has a special department for the export trade, which gathers the information of the consulates and the foreign trade press about prices, and the reports of the manufacturers from their representatives and customers are also attended to. Nevertheless it happens at times that when the new prices come out, they already are obsolete, as in the meantime the exchange value had suddenly altered, or the price in the foreign country has changed. In the last six months these changes have almost always handicapped foreign business, as the mark dropped less (comparatively) than the foreign prices. Almost all the German exporters make every possible effort with the government to end the export control. Yet these efforts will be in vain, as it is of the highest importance for Germany to make dumping impossible.

The feature of the export control system, against which the exporting merchants (not the manufacturers) have the most recriminations, is their obligation to produce a declaration of the mill of which they have bought the paper. So, they are unable to buy at home prices, and the papermaker gets the biggest part of the high prices, though the exporting merchant has the expenses and the risk of the foreign business.

American Representatives in Germany

Many American jobbing houses sent representatives to Germany last fall and winter, and they had good opportunities to buy, as in September the dollar was worth but 80 marks and rose to 330 marks about the middle of November. Yet some of them lost their opportunities by trying to cut prices. In the meantime the home market became very busy, the paper converters opposed too much exporting, and exportation has been restricted, especially that of news print and of sulphite pulp.

Some of the American buyers thought of establishing a jobbing house of their own here in Germany to facilitate business and to get the lower quotations of the jobbers. But they gave it up, as the high taxes would have eaten the profits. They found it more advantageous to entrust a German jobber or exporter with their orders, or to limit their buying to the time of their being here. The high value of the dollar allowed them to live here in the finest hotels quite luxuriously for a small part of their living expenses in the states.

I will try to note the present home market prices of some of the varieties of paper which are weekly mentioned in the market quotations of the PAPER TRADE JOURNAL, mill prices in marks being, for the kilogram (2.2 lbs.): Ledgers, 22-27; watermarked bonds, 30-32; superfine writings, 21-26; sulphite bonds, 18-26; news, 8-9; book, wood free, s. c., 16-23; book, wood free, m. f., 15-17; kraft, 10-12; binders' board, 6-8. To these home prices, f. o. b. German frontier, must be added an export tax of 6 or 7 per cent, and, in addition, the export price is fixed so high that the difference between it and the price in the foreign country for which the export permit is asked, must be large enough to give the foreign buyer an inducement to buy, and yet permit neither dumping nor too low a price for the home manufacturer and exporter.

German Competition Abroad Growing

The German competition in foreign countries is growing day by day more difficult, as the home prices are rising by leaps and bounds and are no longer very far from the prices of the world market. Though the low standing of the mark apparently helps the foreign business, yet at the same time it raises the cost of living, as about one-third of the victuals must be imported from America. No month elapses without new demands of the workmen for higher wages, and they must be acceded to, otherwise it causes a strike, which almost always is successful for the strikers. Now the wages are about 15 to 20 times as high as before the war and their rising is not yet at an end, for the cost of living has risen in a still higher degree.

Expansion of the Mills

The expansion of mills has made great headway in the last year. The big concerns of Waldhof, Stinnes (Koholyt) and Aschaffenburg have again been enlarged and have attained a commanding position in the home and foreign markets. Almost all the Limited Companies have more than doubled their share capital, and many of them have created preferred shares endowed with manifold voting power, which must remain with the present leading directors, so that they cannot be bought by foreigners. The object of this measure is to hinder foreigners from buying at the exchange the commanding interest in the companies. But the raising of the share capital was necessary, not only for buying new mills but also for having working capital, as all commodities and raw materials had enormously risen in price; pulpwood and coal, for instance, cost now about 40 times as much as before the war.

The conventions of the manufacturers of the different sorts of paper and board comprise big and small firms with modern and antiquated mills. The price is fixed so that even the least efficient mill may exist. This method leads to rather high prices, at which the modern and well conducted mills make big profits. This system may be followed as long as the demand exceeds the production, and that is the case now and will probably remain so for a long while, or as long as the low exchange of the mark makes it possible to do a big export business. One country has meanwhile closed its frontier to German paper and paper wares. This country is Switzerland, where the paper mills came to a standstill last summer, as they could not make paper at a price at which German jobbers could sell it to their customers. There are quite a number of efficient paper mills there which during the war sold paper to France and Italy, but on account of the high exchange of the Switzerland frank can no more do so.

Other countries probably would have followed if the newspaper publishers had not had influence enough with members of Parliament to secure the entrance of cheap foreign printing paper.

The Pulp Market

Germany does not produce more mechanical pulp than the German paper mills absorb. The big paper mills have made themselves independent of the pulp mills, and of water conditions, by erecting steam-driven wood grinders. The excessive drought which characterized the year 1921 caused the market for mechanical pulp to be very strong throughout the whole year. The price of pulpwood was stationary at about 250 marks the cubic metre until September and rose to 500-600 marks (in the forest) at the end of the year. Mechanical pulp followed this movement and rose from about 250 to 500 marks for 100 kilograms of dry mechanical pulp.

The German chemical wood pulp mills produced in the last year before the war about 800,000 tons of 1,000 kilograms. Germany imported in the same year about 50,000 tons from Scandinavia (mostly for making kraft paper), and exported about 180,000 tons, mostly sulphite pulp. More than one-third of the pulpwood for the chemical pulp mills had to be imported from Russia and Austria. The production of chemical pulp became less during the war, and the foreign trade ceased. Now the exportation of chemical pulp is possible again, but the importation of pulpwood has become much less, as there is no trade with central and northern Russia. Some pulpwood is being got from Esthonia and Finland, and the home forests are the chief suppliers by bigger cutting for this purpose, as there is virtually no house building because of the enormous costs. The price of unbleached chemical pulp for home consumption has risen from September to the end of the year for 100 kilograms "unbleached" from 300 to 640 marks, and is now 800 to 1,000 marks.

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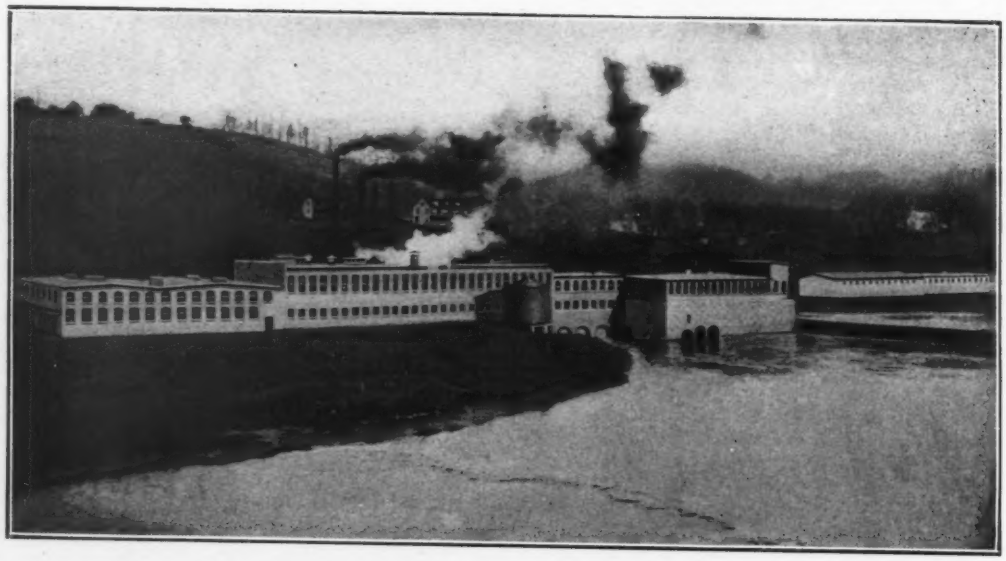
BEDFORD PULP & PAPER CO.



Paper and Pulp Mills of Bedford Pulp & Paper Co. at Big Island, Va.

Manufacturers of

BUTCHERS' FIBRE

Special Papers for Fibre Containers

General Offices: RICHMOND, VA.

Paper and Pulp Mills at Big Island and Coleman Falls, Va.

Mill Profits

The big limited companies earned in 1921 between 25 to 30 per cent of their share capital for distribution to their shareholders and besides could put high sums in reserve for depreciation. But considering that the mills represent gold values, while the dividends are paid in depreciated paper money, the profits cannot be called excessive. Like everybody in Germany, the paper and pulp mills must pay very high taxes on their profit, and besides the shareholders do not get the whole dividend, for before all the floc takes away ten per cent of it.

Paper Mill Machinery

When the war broke out, the German builders of paper-making machinery had an abundance of orders for countries which became our enemies. Some paper machines were ready for shipping. They were shipped some six years later, and during the war the machinery builders were compelled to work also for war purposes. Workmen were scarce; prisoners and women took the places of those who became soldiers. Only the most urgent orders and repairs for the German and Austrian mills and those in the neutral European countries could be executed. One difficulty was the scarcity of copper and copper alloys, which hampered also the work of the machine wire factories. These and other difficulties are now a thing of the past and a mere question of money. During the war the Scandinavian machine factories made some headway, yet they cannot compete with the German factories, which have the advantage of half a century's training, of old connections and of the low exchange. So all the German builders of paper machinery are very busy. The German paper mills have spent and do spend the main part of their profits in repairing their machinery and enlarging their producing power by erecting new machines of modern type. Machines have been built in the last year for home and foreign mills with a width of 12 to 15 feet and for speeds of 600 to 700 feet per minute. Higher speed could be attained, but the mill managers do not think it desirable.

The Association of Paper and Pulp Chemists and Engineers

This association was founded in 1906 and may be called the mother of all associations with similar purposes. Some years ago it was the only one, and the progressive technologists in the pulp and paper trade all over the world belonged to it. Later on independent associations arose in Sweden, America, Norway, England, Finland and France, but the mother society retained her foreign members, and after the war, also, some of the American and English members returned. The society publishes a purely technical and scientific monthly magazine under the title *Zellstoff und Papier*, containing original and translated papers which on account of their length would not find place in the trade papers. The association has now about 700 members, more than 200 of them in foreign countries. The president is Dr. Hans Clemm, the general manager of the Waldhof concern.

The Outlook

In the last three weeks the exchange value of the mark again dropped from \$1 = 190 marks to \$1 = 230 marks. This is the consequence of the weekly reparation payments of the government in gold values which must be bought for paper money; the growing inflation raises the prices of all commodities and therefore also the wages. The country and the people get poorer day by day, yet there is work enough, for the low exchange facilitates exportation. German printers and bookbinders get orders from England and Holland for books and advertising matter, and some of this is mailed to the ordering countries, big savings being made by the difference of the postal rates here and there. So we witness the strange spectacle, of the poor country being busy, while the rich ones cannot give work to their people. The Allied Powers cannot forbid the Germans to export, otherwise they get no reparation payments. Therefore, probably the present state of affairs which is so unfavorable to all parties concerned, will not change until the rich countries find a way to lessen the reparation payments of Germany and in that way to improve the exchange value of the mark.

BROMPTON PAPER CO. IMPROVEMENTS

The Brompton Pulp and Paper Company has within the past few months completed important improvements at the plant at East Angus, Que.

Among the major construction jobs is an up-to-date 60-ton ground wood mill and an 1,800 b. h. p. boiler plant.

The groundwood mill is of concrete and brick construction, 126 x 79 feet and two stories high. The screen and wet pressroom adjoining the north wall of the ground wood mill is of the same construction, with only one story, 169 x 87 feet.

The grinding installation consists of three Voith magazine grinders, with floor space and foundations for a future installation. These grinders are electrically drizen, individually, by 1,400 h.p. direct connected motors. The grinders are supplied with four-foot wood, each having a capacity of approximately 20 tons per day.

The slush from the grinder pits flows along with the stock from two other ground wood mills by gravity to the sliver screen, from there it is pumped to the knotters, then flows by gravity to the fine screens, then by gravity to the wet presses, where any surplus is lapped for storage or shipment, or at the same elevation to the pulp thickeners, then to a series of chests, from whence it is pumped through some 1,600 feet of pipe to the news mill.

The new sulphate boiler house is one of the most modern and up-to-date power plants in the country. The building is of brick, concrete and steel construction. It is 114 x 80 feet.

The battery consists of three Babcock & Wilcox boilers, with a normal rating of 600 b. h. p. each, with provision for a future installation. The boilers are fed by chain grate stokers. The ash and coal handling systems are of the most modern type. Ample conveniences were provided in the line of instruments for measuring the feed water and weighing the coal as it is fed to the boilers. The feed water is taken from the Cochrane metering heater and fed to the boilers by direct-connected steam turbine pumps. Both forced and induced draft fans are included in the installation.

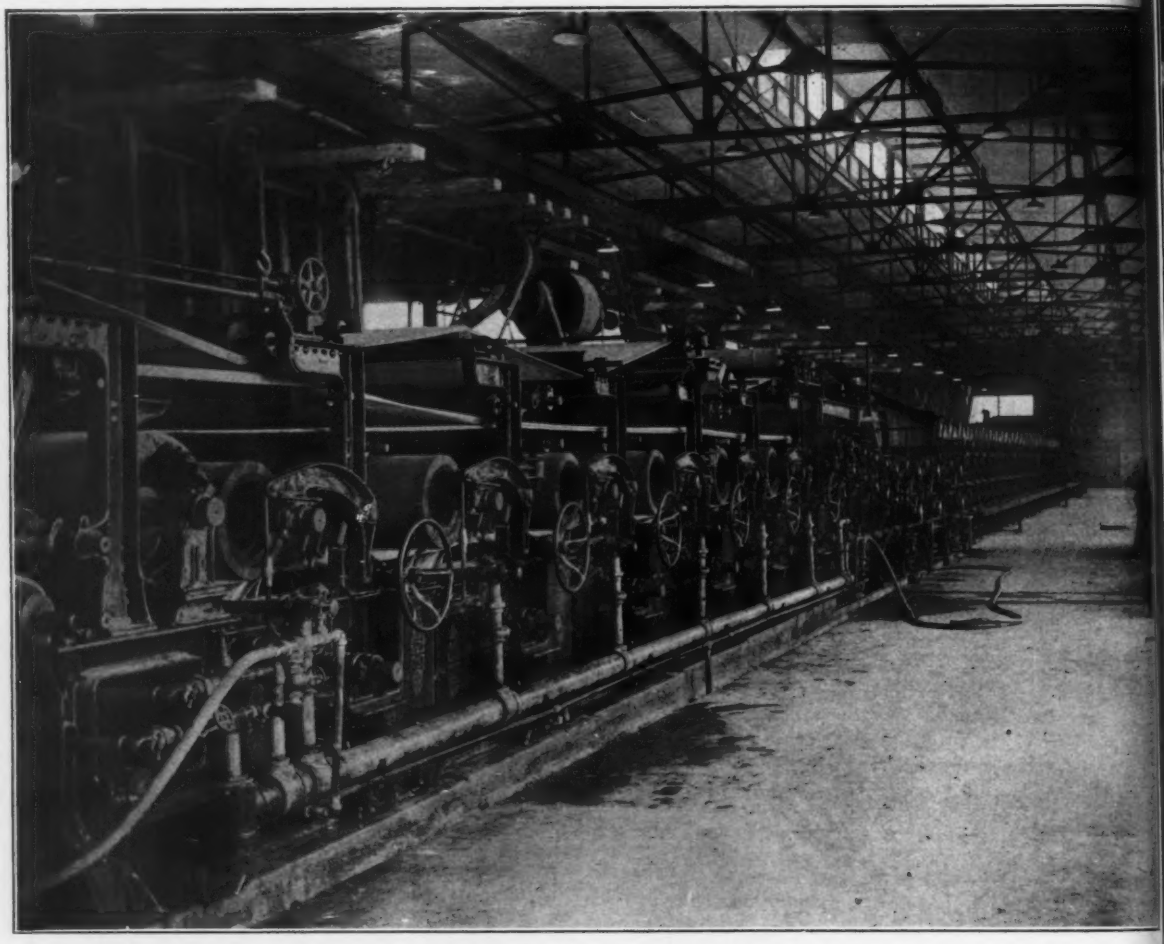
During the same period it was found necessary to install more boiler capacity in the steam plant on the east side of the river, supplying two 160-inch news print machines and two smaller machines making wrapping paper. An addition to the existing steam plant, comprised of another 600 b. h. p. Babcock & Wilcox boiler, fitted with type "E" mechanical stoker, forced and induced draft fan, economizer with by-pass, making a total normal boiler capacity of approximately 2,400 h.p. With this new installation it is possible to carry peak loads during the cold winter months, whereas previous to this installation the existing boilers were taxed to their utmost while carrying the heating load in the winter-time.

Considerable changes and improvements were found necessary in the sulphate mill, which has resulted in a great production with a saving of lost time for repairs. The causticizing room was completely renovated. A number of causticizing tanks were renewed, new agitators, shafts and drives were installed. Concrete floors and drains were also renewed. A liquor storage system was installed by using the old causticizing tanks.

In the recovery room the furnaces and evaporators were given their share of the repairs. The old cylinder type of dissolving tanks were taken out and replaced by new tanks of greater capacity. The old drives were renewed and replaced by new line shafts driven by electric motors.

Within the past year 700 square miles of virgin timber have been added to the company's limits.

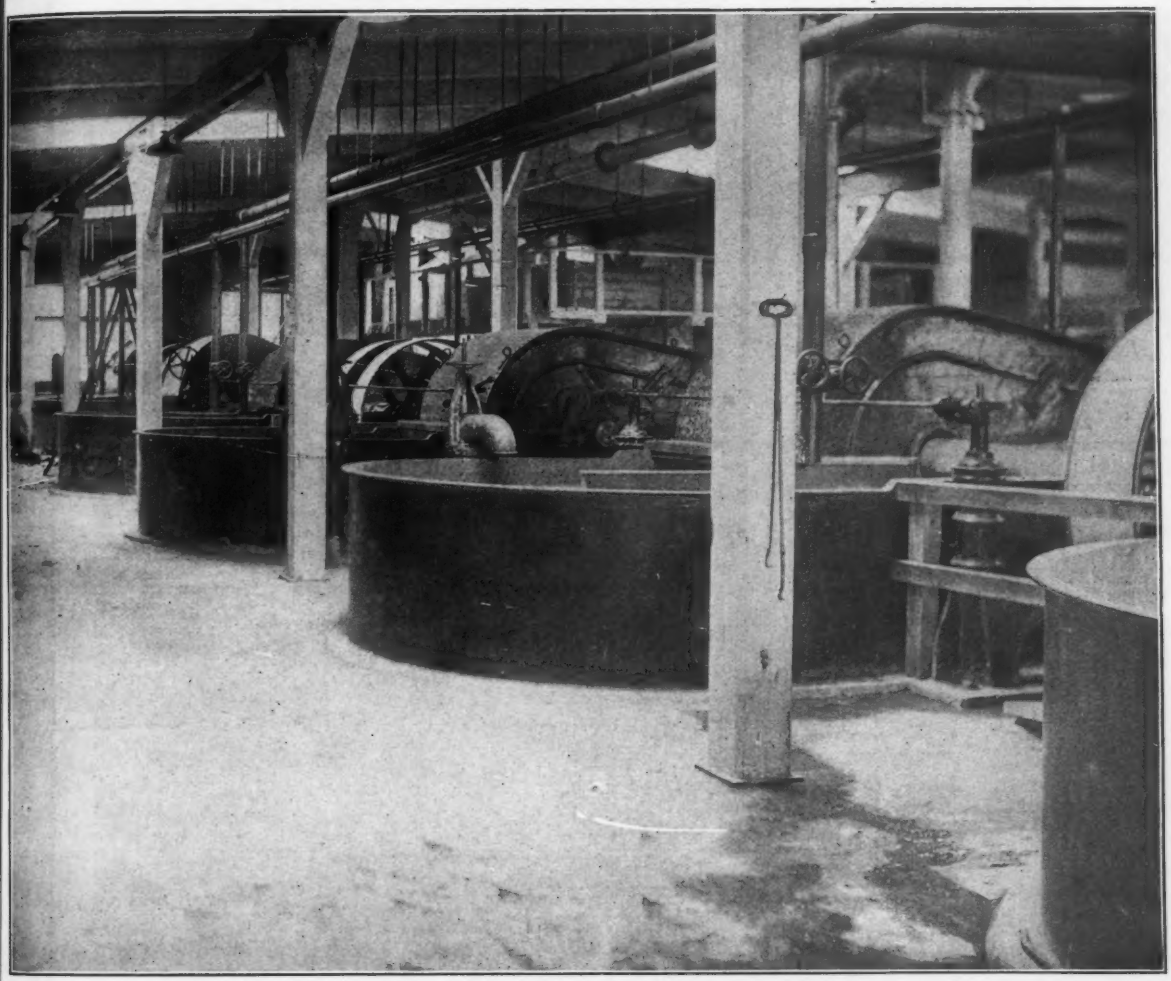
DOWNINGTOWN MA
EAST DOWNING



BOARD MACHINE

CYLINDER AND FOURDR
BEATERS—FLYBA
PAPER MILL

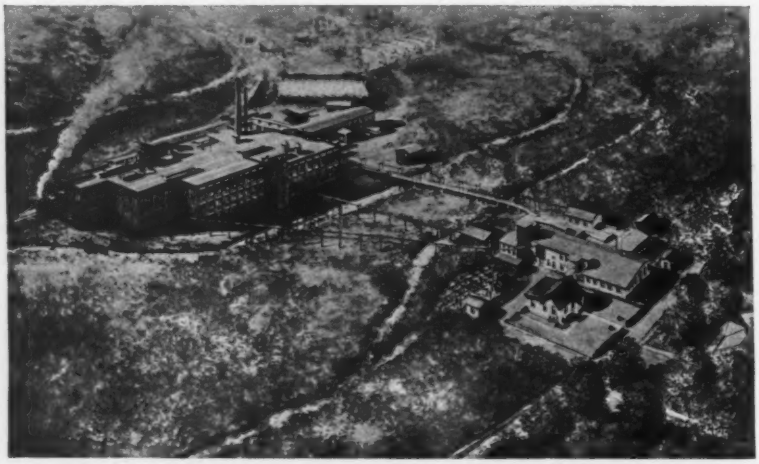
NUFACTURING CO.
OWN, PA., U. S. A.



RECENT BEATER ROOM INSTALLATION

NIER PAPER MACHINES
RS—BED PLATES
MACHINERY

The Plants Behind the Product



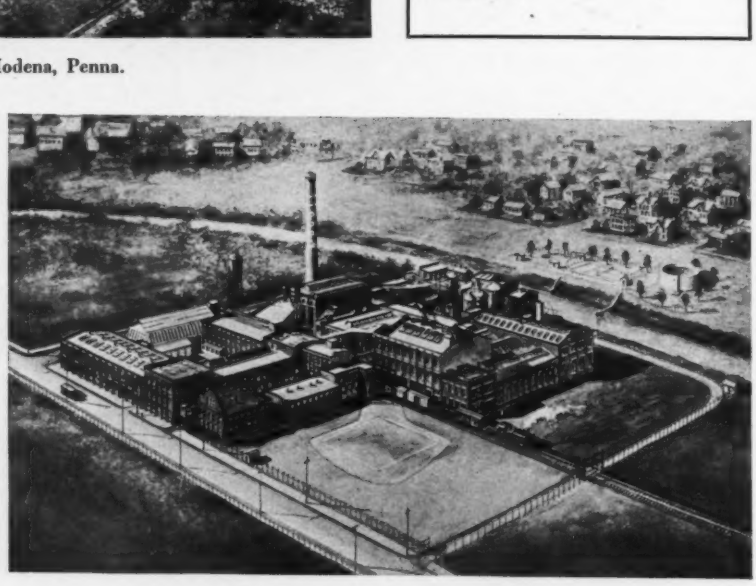
Paper Mills, Modena, Penna.

These two modern, up-to-date plants are devoted to the manufacture of Genuine Vegetable Parchment Exclusively.

Four Fourdriniers at Modena are working full time to supply the Parchmentizing and Printing plant at Passaic.

The Passaic Plant takes the entire output of the Pennsylvania mills.

Only pure artesian well water is used in the Parchmentizing process, insuring a clean, sanitary sheet of Parchment to protect delicate, moist food products.



Parchmentizing and Printing Plant, Passaic, N. J.

Capital and Surplus
$3,250,000

Paterson Vegetable Parchment

Nearest to Perfection

Cable Address: "Parchment"
Western Union Code

Manufactured by

The Paterson Parchment Paper Co.

General Office

Passaic, New Jersey

Past and Present of Paper Making in Japan

Industry Started About Half a Century Ago and Its Progress Has Been Slow Owing to the Undeveloped State of Japanese Finance and Culture in General Which Naturally Required a Limited Amount of Paper—Recent Developments, However, Have Placed the Pulp and Paper Manufacturing on a Much Higher Plane—While the Demand Is Still Slow the Outlook Is Constantly Improving.

Written Especially for the Annual Number of the Paper Trade Journal by Our Regular Correspondent

The manufacture of paper in Japan was started in the year of 1873 and since then its progress has been very slow, being influenced by the undeveloped state of Japanese finance and culture in general, which naturally required a limited amount of paper. However, in the year of 1890, one of the promoters of the Fuji Paper Manufacturing Company which is now regarded one of the largest of its kind in the East, was despatched to Europe to study the process of manufacturing paper from woods and on his return a factory was established at the foot of Mt. Fuji. At the time, only one machine was run in making paper, the output of which was sufficient to cover the entire demand of all the news publishers in Japan, and leave a surplus of 30 to 40 per cent. According to what the records tell us, that surplus was a hard knot to dispose of. Since then, the industry has made a rapid progress. But at the time of Russo-Japanese war, the expense of producing paper in Japan was so great as compared with that in America, Sweden, and Norway, that paper manufactured in those countries was cheaper, even with freight and duty added.

In the year 1906 just after the Russo-Japanese War, Japan began utilizing woods produced in Hokkaido, north extremity of Japan, in making paper. Woods in Japan proper are generally regarded unsuitable for the purpose because of poor quality and comparatively high price. "Ezo Pine," or Abies Sachlinensis, coniferous class of woods, or those produced in the north of the 47th degree of latitude are considered the best for paper making. Woods produced in Karafuto—formerly called "Sakhalin"—a small isle lying north of the Hokkaido and those on the "Coast Province" of Eastern Siberia are also considered adaptable.

At that time even the most skilled workman was able to produce only 200 feet a minute with a machine 75.6 inches wide which was the largest in Japan then.

Beginning of a New Era

In August, 1921, however, the Fuji Paper Mills installed in their Hokkaido plant a machine 186 inches wide. This machine was started in November, producing at the rate of 800 feet a minute a speed four times as great as the first machine mentioned. This clearly indicates the rapid progress Japan has made in recent years. At present, Norway and Sweden are very skilful in making the thinnest paper, while America makes it a distinctive feature to produce the thick paper most quickly, therefore Japan, after making elaborate efforts and taking into consideration the strong points of those countries, is now making news print of substance between America and Sweden. Further she is doing her best to make paper at as cheap a rate of production as possible, by producing a large amount of paper with as little material as possible. Formerly, materials were brought to the paper factories on workmen's shoulders or on carts and when paper was required to be reeled on roll, such paper had to be sent on to another factory for the purpose, but the present arrangement, requiring no workmen's hands and depending upon the action of machineries exclusively, it is no exaggeration to say that Japan is in no wise inferior to those countries in process of manufacture as in cost of production. While paper manufacturers in general are paying much attention to producing paper at the lowest rate of expense, they are endeavoring not to give the slightest uneasiness to employees. Therefore, even in time of depression in the year of 1920 they never cut down wages, but instead raised them twice, in February and August 1921. In other words, they make it a point to give better wages but not to employ so many workmen.

Making New Varieties of Paper

Prior to the European war Japan preferred to make paper that required little trouble or the so-called "cheap class of paper." This was owing to the inferiority of technique when they manufacture any different kinds of paper or thinner ones, inferior qualities were turned out at a high cost of expense. As a result, paper thus produced was sold at less price than it cost. While other countries were making different weights of paper at comparatively cheap cost during the war-time such paper was not imported to Japan in large quantity, therefore being pressed by the keen demands in the home market, various weights of paper had to be manufactured, which was sold at high prices. This was a unique experience for paper manufacturers in Japan. They did not lose money, but rather profited and now Japan can make any grade of paper from woods, straw, rags of qualities not at all inferior to those manufactured in other countries. However, there is one variety in which she is behind America and Europe viz., packing (wrapping) paper. This is because Japan is now using common sulphite-pulp and not using kraft-pulp, which would cause high cost of production. This leads her to hesitate about packing paper at present. In Sweden and Norway, the process of making this grade of paper has been greatly improved. With a view to following this process, Japan sent a few people to these countries to study it a year ago and expects their return very soon. When this process is mastered Japan may be said not to be behind any paper making country in the world.

Paper Manufacturers' Association Formed

In Japan, leading paper manufacturers organized the Paper Manufacturers' Association some time ago with the idea of improving the art, fixing selling prices, etc. Prices of paper were at high level up until the middle of April, 1920, when the paper market in the city became demoralized. Generally speaking, in the months of June, July, August, demands for paper are always less simply because of the short-nights which naturally afford not much time for reading papers, magazines, etc. The months of September to November are called the reading season, when demands are largest of the year. Therefore all manufacturers expect an unusually big demand in the month of September. But anticipated sales did not materialize and therefore the Paper Manufacturing Association decided to limit output by 20 per cent in the latter part of December, 1920. Why had they taken such a step? Prices of commodities were declining all over the world and if the matter were left

The insert is a view of our Brown's Island Plant, in which we make Kraft and Wrapping Specialties. In our Hollywood Plant (pictured below) we manufacture Blottings, Matrix and Absorptive Papers of all kinds.

Our Famous Brands of Blotting are—

WORLD
HOLLYWOOD
RELIANCE
ELDORADO
VIENNA MOIRE
(Fancy Embossed)
ALBEMARLE
ENAMELED

The Best for Color and Litho. Work. Highly Absorptive.

ALBEMARLE
HALFTONE

A High Finish Regular Blotter for Color and Litho. Work Absorptive on both sides.

YEARS of specializing in the manufacture of Blotting Papers certainly makes us qualified to determine what constitutes high quality in Absorbent Papers. Blotting Paper manufacture is our hobby and we have developed this hobby to the highest state of efficiency, consistent with the production of high grade Absorbent Papers. For attractive design, exquisite color, and best of all, *Service*, our fancy blottings are without comparison.

We Sell to Wholesale Dealers only

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The Albemarle Paper Mfg. Co.

Richmond, Virginia, U. S. A.

New York Office **41 Park Row**

alone, the paper market in Japan would be thrown into a chaotic condition rapidly, therefore the limitation system was taken up in order to lower the prices of paper gradually. If prices of paper were forced down at a bound, paper dealers as well as manufacturers themselves would naturally suffer from the financial operation, in view of which manufacturers gave as much accommodation as possible in every respect to leading paper dealers, lowering prices very gradually. As a consequence, at the end of October, 1921, stock of paper decreased as greatly as 40 per cent when there arose a question about withdrawing the limitation of output, and it is possible that this may be done soon. Be that as it may, the Paper Manufacturers' Association is indispensable for the promotion of the paper business in Japan, in view of the fact that through the association the paper market in Japan had not been thrown into confused state by the worldly depression.

Amount of Paper Manufactured

As regards the amount of paper manufactured in Japan—that is paper manufactured by members of Paper Manufacturers' Association—the appended list will explain all details. Needless to say that list does not include the manufacture of so called Japanese paper, such as tissue, Torinoko, and strawboard paper. According to the investigation made public recently, the total of paper Japan consumes in one year would amount to 700,000,000 pounds. If this figure be apportioned to Japan's population, it amounts to 12 pounds per head per year and according to what we learn about foreign countries, in the year 1918, France is said to have consumed 48 pounds, British Empire 50 to 55 pounds, the United States of America 58 pounds, while China consumed only 2 pounds. Speaking about prior to the European War, European Russia consumed 22 pounds per head, Asia-Russia 7 pounds, while Japan consumed about 10 pounds. What surprises us most is that the consumption of the United States of America in the year 1920 was figured at 112 pounds per head. From the above, Japan seems far behind the advanced countries, while it is specially amazing to note the rapid progress the United States of America has made in recent years.

Demand for Paper Increasing

Demand for paper in Japan is increasing at the rate of over 10 per cent per year. While at present, the supply of paper seems not to equal the demand after two years it is obvious that demand will make such increase that supply will become short. Notwithstanding this, Japan proper or even Hokkaido are no longer in a position to meet such increasing demands, but they may be met by Karafuto. Fortunately, during the European War, three pulp-factories were established in Karafuto the output of which will amount to about 80,000 tons per year. This 80,000 tons not being sufficient to meet the home demand, Japan is now importing about 50,000 tons of pulp from overseas countries. Therefore every endeavor is being made for additional pulp-factories in Karafuto. The factories at present are established near the seashore for shipping facilities, but in the inner part of the island, there are many good forests untouched and before long the forest-railways are to be built to reach there. Also there are many good forests on the coast province of eastern Russia with abundant coniferous woods, in which some members of the Paper Manufacturers' Association have already invested capital as the reports put it.

News Print First in Demand

Among papers of various kinds, news print stands first in demand and improvement. In the year 1916, the largest publishers in Japan could only issue 200,000 per day, while to-day some news publishers issue something above 600,000 per day. If, therefore, the improvement continues to such a degree, the news publishers will naturally get their supplies from overseas if the expectation of manufacturing enlargements in Japan are not realized within a few years.

During the war time, Japan had 29 strawboard factories all of which possessed the up-to-date machinery, but at present only 8 factories are run. This, needless to say, is caused by the world-wide depression.

As is shown on the attached list, total amount of paper manufactured declared by the Paper Manufacturers' Association was put at 129,000,000 pounds in 1904, and it increased to 230,000,000 pounds in 1911, and to 559,000,000 pounds in 1920. This 559,000,000 pounds shows an increase of four times as much compared with that of 1904, within 16 years. October, 1921, showed an output of 45,000,000 pounds a month to which 20 per cent limitation being added, it represents 54,000,000 pounds monthly or 600,000,000 pounds per year. That is to say, the last figure will indicate an increase of 13.3 per cent per year since 1904.

PAPER MANUFACTURED, EXPORTED AND IMPORTED

Years	Amount Manufactured, lbs.	Amount Imported, lbs.	Amount Exported, lbs.
1904	129,215,000	34,046,000	11,014,000
1905	134,441,000	76,336,000	11,042,000
1906	132,432,000	79,257,000	19,396,000
1907	147,296,000	89,890,000	14,044,000
1908	148,647,000	65,052,000	9,788,000
1909	162,104,600	90,925,000	7,073,000
1910	191,591,000	92,823,000	14,247,000
1911	228,163,000	74,002,000	9,566,000
1912	251,337,000	77,214,000	13,462,000
1913	295,893,000	80,038,000	794,000
1914	327,614,000	54,190,000	14,406,000
1915	367,579,000	27,068,000	26,937,000
1916	405,468,000	35,694,000	55,427,000
1917	455,000,000	16,637,000	69,485,000
1918	498,965,000	34,277,000	72,815,000
1919	519,142,000	56,303,000	66,352,000
1920	559,835,000	56,879,000	51,049,000

Not including straw board.

KIEFER PAPER CO. IMPROVEMENTS

The Kiefer Paper company at Brownstown, Ind., has been succeeded by the Kiefer Paper Mills. The latter company buying the assets, good will, etc., of the former corporation and has since been operated as a common law trust estate.

Since the change of ownership and management the concern has greatly enlarged its output. Early in 1920 work was started on a campaign of improvements, which were completed in 1921. A new single cylinder 64 inch trim machine was installed, in addition to a 40 inch and 56½ inch previously in operation. The mill specializes in light chip, rag lining, ham wrappers, indented packing paper, carpet paper and papier mache board, the plant having a total output of 30 tons daily.

The new machine room is one of the lightest and airiest in Indiana. There is a 28 foot glass monitor running the entire length of the room. The construction of this division is brick, steel and glass.

The boiler room has also been entirely rebuilt and a 400 horse power Sterling water tube boiler and new battery of pumps installed.

John E. Kiefer, treasurer of the company, speaking of the prospects, present and future, said: "It is true that we have felt the business depression in common with other mills, but we have been able to operate two of our three machines steadily since January 31 and are optimistic regarding the future.

"Trade that we sold 15 years ago, is still with us. By giving good quality and values we have been able to retain our old customers and add many to the list. With our new equipment and enlarged capacity, we believe we are in even better position to give better service and quality than at any time in the past.

"Our plant has been a money maker from the very start. It was established in 1908. The stock is closely held."

John E. Kiefer, present treasurer and general manager of the company, has held those positions for years and it is largely due to his energy and ability that the success noted has been attained.

Mr. Kiefer, in a statement to the PAPER TRADE JOURNAL, declared that much of the company's success has been due to the loyality of employees and the fact that the concern has been able to retain many of its help for long years of service.

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HOWARD BOND **HOWARD LEDGER**

Largest News Print Mill on Continent

With the Installation Last Year of Three New Machines, Making a Total of Seven News Print Machines, and Having a Capacity of 500 Tons of News Print Daily, the Abitibi Power & Paper Co. at Iroquois Falls, Ont., Now Enjoys That Distinction—Nos. 6 and 7 Machines the Largest News Print Machines in the World—Have Capacity of 98½ Tons at Speed of 700 Feet Per Minute — Other Improvements.

Written Especially for the Annual Number of the Paper Trade Journal

The mill of the Abitibi Power and Paper Company at Iroquois Falls, Ont., is now the largest news print mill on the continent. With the installation last year of three new machines, making a total of seven news print machines, it now has a capacity of 500 tons of news print daily.

Largest News Print Machines in World

The Abitibi mill also has the distinction of having the two largest news print machines in the world. Nos. 6 and 7 machines, which were built by Charles Walmsley & Co., of Bury, England, are 232 inches wide and have a capacity of 98½ tons daily at a speed of 700 feet per minute. Previous to the installation of these three machines, the output of the paper mills was 250 tons of news print daily. All three of the new machines are of exceptional interest, Nos. 6 and 7 because they are the two largest paper machines in the world, and No. 5 because it is the first machine in Canada to be equipped with sectional electric drives; in fact, the first to be driven by the individual sectionalized motor drives of the Westinghouse Company.

On the two big machines, Nos. 6 and 7, the wire length is eighty feet and width 232 inches, making a sheet 221 inches in width. The drive on No. 6 is a 500 h.p. electric motor and on No. 7, a 500 h.p. Belliss & Morcom vertical engine, and the power in both is transmitted by belt and rope drives.

One of the features of these machines was their careful erection by Walmsley & Co., so that when power was first turned on, they

View From the Wet End of the Largest News Print Machine in the World at Plant of Abitibi Power and Paper Co., Iroquois Falls, Ont.

FELIX PAGENSTECHER, President C. A. FOX, Secy. & Treas. NOAH BRYANT, Vice President
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started off without the slightest trouble, and have been increasing in efficiency ever since. In September and October, for instance, the operating efficiencies ran from 91 per cent as high as 96.4 per cent.

Special Features

There are two or three special features on these two machines. The breast roll is of hard brass shell of a special design, having wrought gudgeon journals which work in improved phosphor bronze bearings. The couch rolls are of special design and made from hard cast brass shell mounted on strong cast iron rollers. The extreme width of these two machines made it necessary to design specially many parts of the machine in order to give them the necessary stiffness. The couch framing is arranged so that a wire can be put on with very little labor, the rolls being carried with geared swinging arms for lifting each end of the top roll, and there is also an arrangement to give a variation of couch pressure. There are eight brass vacuum boxes with expanding heads and maple covers. There are the usual three presses, the top press roll journals being carried in the latest type of radial arms with screws, wheels, etc., for adjusting them.

The dryer section consists of thirty cast iron dryer rollers five feet in diameter, these also specially designed so as to prevent deflection. They are cast of a special mixture which gives tensile strength of from ten to fifteen tons per square inch. All drying cylinders are fitted with special water lifter.

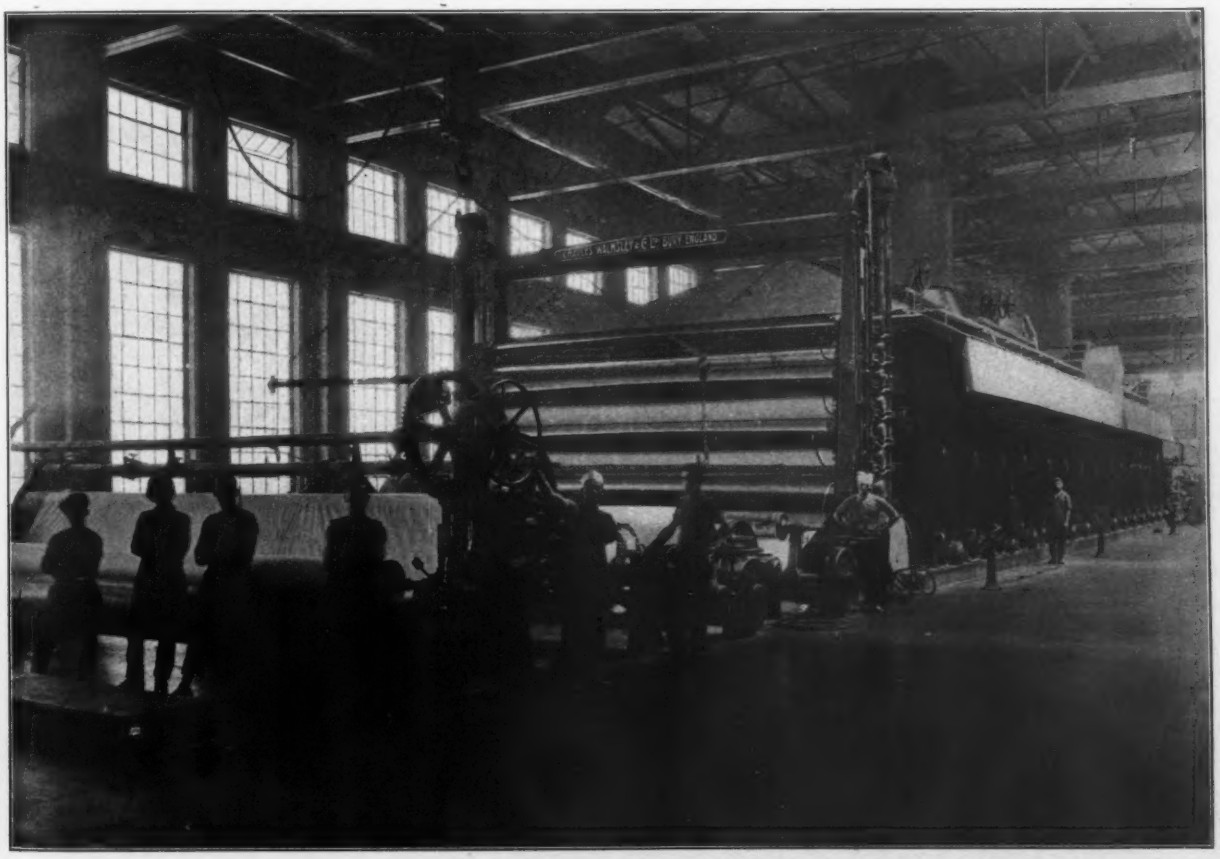
The finishing calender is fitted with ten rolls, the bottom roll being thirty-two inches in diameter and carried in swivelled pedestals with anti-friction metal self-oiling bearings. The upper rolls are carried in cast iron self-oiling sliding blocks, with phosphor bronze bearings. All these bearings are self-lubricating. The gearing is of the Lloyd & Hutchison patent drive, on the basement principle, working without gear wheels or friction clutches.

No. 5 machine has a wire of 158 inches in width and 80 feet in length. The three presses use 65-foot felts. There are thirty five-foot dryers, ten-roll calender uniform speed reel, geared type unwinder and two-drum high speed winder. The maximum speed of this machine is 800 feet per minute.

In order to look after the wants of these new machines, two Noble & Wood beaters were installed with a battery of fourteen Sherbrooke deckers. Five Sherbrooke centrifugal groundwood screens and five Sherbrooke savealls were installed in the wet room with the necessary pumping capacity to handle the stock.

Extension to Ground Wood Mill

The latter part of the year 1921 also saw large extension in the groundwood mill. In the old mill there were ten rows of three grinders, thirty stones in all, run by hydraulic power. This has been increased to fifty-one stones, twenty-one additional machines being put in, fifteen of these run by electric power. The uniformity of speed of these fifteen electrically-driven stones has given the greatest satisfaction. All power for these additional stones, and in fact for the whole mill, is now derived from the new dam and powerhouse at Twin Falls, four miles across the horseshoe bend of the Abitibi River. Morrow & Beatty were the contractors who built the dam and powerhouse, which was a work of great magnitude, as well as great difficulty. By March 21, 1921, construction



VIEW FROM THE DRY END OF THE LARGEST NEWS PRINT MACHINE IN THE WORLD AT PLANT OF ABITIBI POWER AND PAPER CO., IROQUOIS FALLS, ONT.

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GENERAL VIEW OF PLANT OF ABITIBI POWER AND PAPER CO., IROQUOIS FALLS, ONT.

was so far completed that the installation of the first generator was begun. By June 23 this generator was in running order. The second generator was put in commission on July 2, and the third and fourth on July 11 and 25.

The Powerhouse

The capacity of the powerhouse at present is 24,000 h.p., but there is sufficient room to add another 6,000 h.p. generator, which would bring the capacity, if needed, to 30,000 h.p.

In order to handle the power across the transmission line, two sub-stations were erected at the mill. Sub-station No. 1 contains three 1,750 KVA transformers, supplying power for the fifteen grinders. Sub-station No. 2 contains three 5,000 KVA transformers, which supply the power for the pulp and paper mill.

An important addition to the plant which is just being completed is the new wrapper machine, which will have a capacity of about thirty tons of wrapping paper per day. Ten tons of this will be used in the mill, leaving a balance for sale. The wrapper machine is the production of the Pusey & Jones Company, of Wilmington, Del.

Another improvement of note during the year was the establishment of a new grinder stone storehouse, in which temperature and moisture are under perfect control, so that the stones will be properly aged. The storehouse holds a year's supply in such a way that the stones taken out are the stones which have been in storage for a year.

The necessity of using four-foot wood as an aid to the settlers caused the building of a special slasher. This slasher has four chains which carry the 32-inch blocks to the grinder room conveyor and the short blocks to the chipper conveyor for the sulphite mill.

The slasher handles about two hundred cords of four-foot wod per day.

A considerable addition had to be made to the steam plant. Five retort Taylor automatic furnaces were put in and six 478-horsepower, water tube, Babcock & Wilcox boilers.

Three Sturtevant economizers were installed, and Bailey recording boiler meters, a Cope's feed-water regulator, and Bayer soot blower on each furnace.

A complete recording equipment has been devised for the heating balance of the steam plant operation.

CHICAGO CONSIDERS RETAIL PRICE LIST

The Executive Committee of the United Typothetæ of America, in a four-day session, April 5, 6, 7 and 8, at the Drake Hotel, Chicago, adopted a resolution to have local Typothetæ form a co-operative paper purchasing association wherever the paper jobbers refuse to co-operate with the local printers in the establishment of the retail price list. According to the speakers, this action was taken, because the printers feel that they are not being fairly treated by the paper merchants who publish price lists with net prices, and thereby handicap the printer in his resale of the paper. The practice of publishing net lists, it was charged, has deprived the printer of the same assistance in doing business which is tendered retailers in other lines of industry.

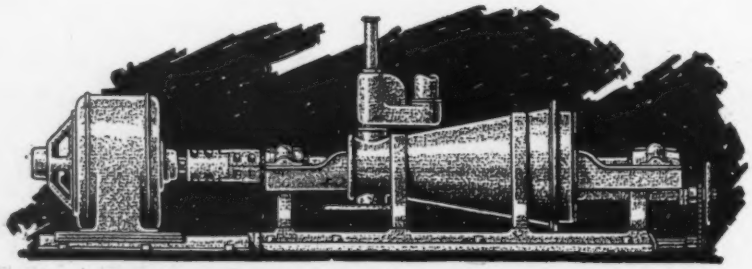
At a meeting of the local Typothetæ last month, the question of deciding whether Chicago as a printing body would ask for the retail list or continue operating under the present paper agreement was turned over to a committee. This committee has not been entirely appointed, and later will confer on the subject and make recommendations in accordance with their findings.

A representative of the PAPER TRADE JOURNAL interviewed a number of the larger printers of Chicago on the paper question this week. Most of these larger printing houses are treating the subject with disinterest, while some of them are very much against the retail list. One publishing house announced that about half its printing buyers purchased their own paper, and said further that they often suggested to customers that they buy their own paper.

Representatives of paper merchants in Chicago now, have instructions to refrain from selling paper to a logical customer of any printer, especially in small lots. This is in accordance with the standing agreement between the two industries which has been in operation since January, 1920. In this agreement the paper merchants say:

"Conditions in the paper industry are such, and always have been, as to make it impossible—or at least impractical—for the paper merchant to refuse to sell certain consumers of printing papers who elect to make direct purchases of their supplies. Paper mills with their own distributing equipment, as well as brokers and commission men, are continually soliciting this kind of business, which, with the unwillingness of the printers to refuse to print papers which they do not buy, creates a situation which manifestly imposes on the paper merchant the necessity of asking similar freedom in this particular field."

The agreement then goes on to say that the paper merchant subscribes to the principle that it would be far better if all consumer business could be handled through the printer, and that this can probably be accomplished by systematic efforts to divert this business in what is thought to be its proper channel.



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TECHNICAL ASSOCIATION MEETS

Seventh Annual Meeting of the Technical Association of the Pulp and Paper Industry Is Held at the Waldorf-Astoria, New York

George E. Williamson, of the Strathmore Paper Co., Mittineague, Mass., to Head the Association for Another Year—Association Stands Today on a Broader and Firmer Basis Than Has Been Possible Heretofore—President Calls for More Effective Committee Work — Report of Secretary-Treasurer Wm. G. MacNaughton Shows That the Association Is on Sound Financial Basis—Papers and Reports.

The seventh annual convention of the Technical Association of the Pulp and Paper Industry was held at the Waldorf Astoria, New York, from Monday to Wednesday inclusive. All the meetings were well attended and the convention was in every respect the most successful the association has ever held.

THE PRESIDENT'S ADDRESS

George E. Williamson, the president, in his opening address said:

"The twelve months just past, comprising the Technical Association year, have been quiet ones in business and industry; not so with this association. The spirit of reaction so rampart and wide spread has affected us; but withal, it has been a year of progress and achievement.

Co-operation with American Paper and Pulp Association

"One of the first problems to which the Executive Committee gave attention was that of closer co-operation with the American Paper and Pulp Association. As a result of careful deliberation, the offices of our association were moved in August to 18 East Forty-first street, which building now houses the headquarters of the American Paper and Pulp Association, Writing Paper Manufacturers Association, Pulp Association, Cost Association, Woodlands Section, Salesmen's Association, and Technical Association.

"It is needless to say that this close contact permits more intimate co-operation with the parent association and subsidiary organizations, and also allows greater efficiency and reduced costs in the operation of our office.

Secretary-Treasurer

"One of the outstanding events of the year has been a change in the office of secretary-treasurer. In September, Thomas J. Keenan, secretary-treasurer of the association since its organization, presented his resignation to resume the editorship of *Paper*. The Technical Association is deeply indebted to Mr. Keenan for his faithful, painstaking and conscientious service, and for the large and prominent part he has taken in giving the association the standing it has today in the pulp and paper industry.

"We were particularly fortunate that circumstances permitted us to obtain the services as secretary-treasurer of William G. MacNaughton, a charter member and former officer of the association. Although Mr. MacNaughton has been with us since December only, his technical education and training, together with his wide practical experience in the industry, have permitted him to take up the work vigorously and with little hesitation.

GEORGE E. WILLIAMSON, PRESIDENT

"It was planned that Mr. MacNaughton should assume office November 1, but he was unable to do so on account of a serious accident. Through the courtesy of the Cost Association, Thomas J. Burke, secretary, acted as assistant secretary of the Technical Association during the month of November. We are indebted to Mr. Burke and the Cost Association for their timely assistance in the emergency.

Fall Meeting

"An invitation was received a year ago from the Superintendents Association of the Pulp and Paper Industry for a joint meeting in the fall. Accordingly, arrangements were made for a meeting to be held during October in Washington, D. C., Wilmington, Del., York, Yorkhaven, and Philadelphia, Pa.

"On account of unfavorable business conditions existing at the time, however, it was thought best by the officers of both associations to cancel the meeting. Our Executive Committee, however, placed itself on

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record as in favor of a joint meeting at some future time.

"The Superintendents' Association renewed the invitation for a joint meeting in connection with their annual meeting in June. On account of the close proximity of that date to this of our annual meeting, it was decided by our Executive Committee that a joint meeting at that time would be impracticable. However, it is hoped and expected that such a meeting may be held when conditions will permit.

Committee Work

"A genuine endeavor has been made this year to obtain more than ordinary results from the work of standing committees. While the work and product of committees is important in all associations, I believe it is vital in the case of our own.

"An association like ours, organized primarily for service to an industry, can justify its existence only on two grounds; namely,

"1st. The development and dissemination of knowledge which will in any way advance the industry.

"2nd. The affording of means for its members to become acquainted, to exchange ideas, and to encourage and stimulate interest in upbuilding the industry.

"To my mind, committee work is the root of an association's life. If that work is good and effective, and the results are worth while, the association will grow strong and prosper. If committees are non-productive and fail to bring forth achievements beneficial to the industry, then the association must falter and its influence and standing must decline.

"I stress this point somewhat at length because I discern clearly in it the most important problem concerning our organization today. The present enviable position of our association is due, I believe, to the excellent work done by some of our committees. I feel, however, that some of our members do not realize the opportunity for service to the industry as well as the benefit to themselves that exists in sharing the work of our standing committees.

"It is my earnest hope and recommendation that ready response be made to the appeal recently sent out by the secretary with reference to service on committees, and that members of committes will WORK when requested by committee chairmen.

"Several suggestions have been made recently for improving this most important phase of the association's activities, which should receive the careful consideration of the incoming Executive Committee. Among these may be mentioned a more homogeneous plan of committee organization, a tying in of the Service to Members program with the work of the standing committees, and the appointment of the secretary of the association as secretary ex officio of all standing committees.

Service to Members

"Resulting from the group meetings held at the annual meeting a year ago, a committee on Service to Members has been formed during the year. This committee has undertaken a tremendous task, but one of inestimable value to the members, provided the members will co-operate. The report of this committee will show the results of its activities to date and some of the possibilities before it.

"I bespeak your careful attention to this matter, as the thought underlying this plan, if properly developed by the membership at large is capable of bringing forth most beneficial results to the members and eventually to the industry.

Publications

" 'Technical Association Papers, Series 4', containing papers and addresses presented at the annual meeting of 1921, together with a directory of officers, committees, and members, was published in June. It is a very creditable piece of work, but the cost of publication is greater than the resources of the association can continue to meet.

"Feeling the urgent need of a better means of publishing not only the papers and addresses given at meetings, but also the large amount of technical literature which is appearing constantly, your Executive Committee has made a co-operative arrangement with the PAPER TRADE JOURNAL, which it believes will prove very beneficial to the association.

"This publication, as you know, has established a Technical Department to appear weekly under the editorship of the secretary of the Technical Association. All members are placed on the subscription list with the price of subcription paid by the association. In addition, the PAPER TRADE JOURNAL will print and distribute, free of charge to members, all reports of association meetings in a form similar to 'Technical Association Papers.'

"During the year, arrangements have been made for an exchange of publications with the Forest Products Laboratory of Canada, and the Technical Section of the Paper Maker's Association of Great Britain and Ireland.

Finances

"The finances of the association are on a sound basis. The balance on hand is slightly less than one year ago, but this condition was brought about by the unexpectedly heavy cost of publication of 'Technical Association Papers, Series 4.'

"At its first meeting, the Executive Committee adopted a tentative budget for the year, and will recommend a budget for the ensuing year, to which I invite your careful attention. An organization of this size should have a definite financial policy, should operate on a budget plan, and should keep expenditures within the budget allowances adopted.

"During the year, steps have been taken to put our accounting system on a more modern basis, as recommended by the public accountants who have made our annual audits. With the co-operation of Mr. Burke, a new accounting plan has been laid out which will place our books on a uniform basis with those of the parent association, Cost Association, and others, and besides other advantages permit a considerable saving in the cost of the annual audit.

"The increase in dues adopted at the fall meeting of 1920 proved unpopular in the face of declining prosperity in the industry. At a meeting of the Executive Committee held September 15, 1921, it was voted to recommend a reduction in annual dues to fifteen dollars, subject to ratification at this meeting. I recommend, therefore, that you take favorable action upon this amendment to the constitution.

Co-operation with the Bureau of Standards

"The Technical Association was invited to send a representative to a conference at the Bureau of Standards held late in the summer, and former President R. A. Hatch was selected. The groundwork was laid for important advances, which, if brought to fruition should benefit the industry. Committees were appointed to draw up standard classifications of grades of paper, and standardization of sizes and grades, with a view to the elimination of waste and unnecessarily high costs of manufacturing operations. A third committee, consisting of three of our members, was appointed on standard specifications and tests acceptable to manufacturers and consumers.

"The Technical Association is also represented on a committee of the American Paper and Pulp Association, representing the industry, formed for the purpose of co-operation with the Bureau of Standards.

"It is in matters of this kind that the Technical Association should be able to render most valuable service to the industry and to the public.

Education

"Work has continued without interruption on the text books being prepared under the direction of the Joint Educational Committee. Our co-operators across the Canadian borders are outdoing us in the financing of the work, however, owing to their superior

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methods of raising the necessary money for worthwhile projects. This subject will be covered in the report of the Committee on Vocational Education.

"Now that the books are available, I commend them to your use. Much thought, time and money have been spent in their preparation. It behooves the industry now to reap the benefits and rewards that are possible.

"Our brothers of the Technical Section of the Canadian Pulp and Paper Association have given some attention to the question of apprenticeship; that is, of training young men who enter the industry to learn the various processes of manufacture by practical experience in the mills, supplemented by special study courses. My recommendation is that the committee on Vocational Education make a comprehensive study of this subject in co-operation with the Committee on Education of the Canadian Technical Section, and report fully with a well defined plan at the next annual meeting.

"Owing to business conditions, progress has not been rapid on the plan proposed by Dr. Hollis Godfrey, formerly President of Drexel Institute, for co-operation between leading industries and educational institutions. This plan, to which the paper industry is a subscriber, contemplates training young men for direct service in industry by means of collegiate courses combined with practical experience in the chosen industry, to the end that much time may be saved over the normal training period of many years, and that men may be better fitted to grasp and handle the major problems which confront the industry. It is to be hoped that definite progress may be made in this novel but important plan of education during the coming year.

Group Meetings

"At the last annual meeting, several group meetings were held by those particularly interested in the subjects announced, and with a considerable degree of success. On the other hand, there were some criticisms from those who wanted to attend all meetings, but were unable to do so when two or more were carried on at the same hour.

"This plan is to be followed to a degree this year, and I ask your co-operation in giving the secretary your opinion as to the desirability of making group meetings a permanent feature of our annual conventions.

Co-operation with Other Associations

"In co-operation with the Cost Association, a special committee of our members has spent considerable time on the subject of depreciation of paper and pulp mill buildings and equipment. Our committee on Bester Furnishes has also worked conjointly with a similar committee of the Cost Association.

"At the request of representatives of the paper mill felt manufacturers, a joint committee consisting of four members of their industry and four members of the Technical Association has been formed, and the report of this committee will explain its purposes and activities to date.

"Recently, we have been approached by the fourdrinier wire manufacturers requesting formation of a like joint committee to give consideration to improvements in the manufacture and use of wires and the development of standard practices affecting them.

"This work of a co-operative nature should, in my opinion, be encouraged, as the possibilities of beneficial results to the industry are large. In order to derive these benefits, however, the spirit of co-operation must extend beyond the committees, must be widespread throughout our industry, and must be marked by an attitude of give as well as receive.

The American Paper and Pulp Association

"The Executive Committee of the American Paper and Pulp Association has given considerable attention to a plan for rearrangement of methods of financing and for improvements in internal organization of the association.

"The proposed plan embodien a number of changes which vitally affect the service associations, of which the Technical Association is one. As this matter will be dealt with at the annual meeting of the parent association on Thursday, I will not attempt any discussion of it at this time, but I urge your attendance at that meeting in order that you may be in a position to understand thoroughly the various steps of the plan recommended.

Progress in the Industry

"During the year, definite progress has been made along the line of technical development in the industry as a whole, and I will mention a few which may be of particular interest to the members of this association.

News Print

"The development and commercial application of paper machines operating at higher machine speeds, including the successful operation at 1,000 feet per minute and over.

"Improvements in the control of the consistency of the stock.

"The tendency toward the use of neither beaters, nor, more recently, Jordans.

Materials

"The development commercially of cotton linter and hull fiber pulp.

"Attention is still being directed to the treatment of highly resinous woods, such as Southern Pine, for paper pulp in combination with the recovery of resins and turpentine.

"There is still interest in the possible development of a commercial method of de-inking printing paper containing groundwood.

Bleaching

"A more extended use of liquid chlorine instead of bleaching powder.

"New developments in bleaching apparatus enabling the bleaching of pulp of higher density than customary.

"Examples of these developments are the Wolf system installed at Newton Falls, N. Y., and the possible application of bleachers on the design of the Nisgers and Rabus beaters.

Pulp Treatment

"Where the fiber constituents are being mixed with little or no mechanical treatment in cases where the constituents are groundwood and chemical pulps. Examples of this tendency are to be found not only in news print mills generally, but also in mills manufacturing book paper and, to a certain extent, in kraft paper mills.

"Considerable attention in this country and some investigation abroad has been made on the chemical treatment of pulp in the endeavor to duplicate thereby the conditions obtained by the use of mechanical methods.

Engineering

"The commercial development in this country as well as in Europe of the electric steam boiler, and its applicability to locations where the cost of electricity is low or where it is desired to equalize the power demand curve.

"The use of the vapor accumulator developed in Sweden in cases where fluctuating steam loads exist. This apparatus is just in the stage of promotion in this country.

"The possibility of drying pulp and some classes of paper under vacuum.

"The general tendency in new installations, as well as in improving old, toward the sectional electric drive.

"The encouraging results that have been indicated in the use of pulverized fuel.

Waste in Industry

"One of the foremost problems in industry today is that of waste. During the past year, a report has been published on this subject by the Federated American Engineering Societies, which has elicited much comment and attention, as well as considerable misrepresentation.

Fred M. Temple, Prest. Chas. D. Thompson, Treas.

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"I believe that the Technical Association can render valuable service by attacking this problem, studying the findings of the above named report as possibly applied to the pulp and paper industry, conducting investigations on the profitable utilization of waste material, and pointing out by means of scientific control methods how many wastes may be prevented or minimized.

"A specific instance has recently come to my attention in the offer of the Forest Products Laboratory to co-operate with the association in an investigation into the possible utilization of barking drum waste.

"I recommend that the subject of waste receive prompt attention, and that the Executive Committee be authorized to place it in the hands of one or more of the present standing committees, or of a new committee created for the purpose.

Conclusion

"In conclusion, I wish to give expression to my appreciation of the valuable and conscientious work done by the members of the Executive Committee, Secretaries, the Chairmen of Standing Committees, and those committee members who have backed up their chairmen by real efforts.

"I cannot but feel that the Technical Association stands today on a broader and firmer basis than has been possible heretofore.

"With the combination of that spirit of service and capacity for work which has characterized the efforts of our membership in past years, the outlook for the future is indeed bright.

EXECUTIVE COMMITTEE REPORT

Following minor ammendments of the constitution the report of the executive committee was read by R. S. Kellog of the News Print Service Bureau. The committee recommended that in view of the importance of co-operation between the Technical Association and the Superintendents' Association, the latter be extended an invitation to meet with the Technical Association at its fall meeting. It was also recommended that the present service to members be strengthened, and that the members avail themselves of binders provided by the association at the nominal cost of 25 cents to hold the Technical Section of the PAPER TRADE JOURNAL. The helpful co-operation of the Cost Association and the Felt Manufacturers' Association was emphasized as well as the fact that in the near future the manufacturers of fourdrinier wires would also assist the technical group.

The budget proposed for 1922 is to be raised in part it is hoped by an increase in the number of members. In order to secure an adequate membership it was recommended that a special committee be organized to cover all paper territory and fill up the necessary quota through extra endeavor.

PROPOSED BUDGET FOR 1922

The budget proposed for 1922 is as follows:

Salaries	$6,600
Printing	500
Stationery and Supplies	350
Postage	300
Telephone and Telegraph	300
Rent	600
Dues to the American Paper and Pulp Association	250
Meetings	600
Traveling Expenses	500
Subscriptions to the PAPER TRADE JOURNAL	1,000
Miscellaneous	500
Total	$11,000

This sum will be raised by entrance fees and dues of 450 active and associate members amounting to 6,750, 80 junior members at $5 each, $400; 30 corporate members at $100 each, $3,000; 75 entrance fees at $5, $375; receipts from abstracts, $400; sale of papers, $200; interest on bank deposits and Liberty Bonds, $180; and miscellaneous $20, making a total of $11,525.

REPORT OF SECRETARY-TREASURER

William G. MacNaughton, secretary-treasurer, reported the total membership to date to be 477 composed of 281 active members, 100 associate members, 65 junior members, and 31 corporate members. Mr. MacNaughton paid a high tribute to Thomas J. Keenan for the efficient standing of the association when he took over its responsibility in the fall of 1921. He outlined various opportunities for improvement in the manufacture of sulphite, sulphate, and soda pulp, and possibilities for advancement in the use of waste bark for fuel.

W. L. Nixon was appointed chairman of a committee of five to nominate officers for the ensuing year.

REPORTS OF STANDING COMMITTEES

In the reports of standing committees, Ross Campbell, chairman of the committee on abstracts of literature, reported 1,810 column inches of abstracts published during the fiscal year, and a balance of $123.05 in the treasury in favor of the work. He reported that all abstracts were now edited by one man and that a complete indexed reprint would be published each quarter.

Clarence J. West, chairman of the Bibliography Committee, in his report cautioned all those who intend to write bibliographies to consult him before so doing thereby avoiding much duplication of effort.

The second general session of the Technical Association was held in the Myrtle Room of the Waldorf-Astoria, Wednesday, April 12. Following introductory remarks by President Williamsen the report of the Nominating Committee was heard.

ELECTION OF OFFICERS

The following officers were elected: President George E. Williamsen of the Strathmore Paper Company, Mittineague, Mass.; Vice-President F. C. Clark, of the Pejepsenk Paper Company, Brunswick, Me.; Secretary-Treasury William G. Mac Naughton, New York. To serve on Executive Committee for three years: George E. Williamson, F. C. Clark, G. N. Collins, R. S. Kellogg, George H. Harvey, E. C. Tucker, George K. Spence.

PRESIDENT'S ADDRESS CONSIDERED

Edwin Sutermeister of S. D. Warren Company, chairman of the committee on the president's address, delivered at the first session on Tuesday, in his report emphasized the fact that the satisfactory carrying out of the proposed budget depended on an increase in the number of members. Also, that the question of waste in industry deserved the careful consideration of the Technical Association. He made the suggestion that a committee be appointed to cover the subject of waste. The importance of the study of efficiency of the various departments in the mills was stressed at the same time. In connection with the arrangement of the sectional meetings Mr. Sutermeister stated that this year the element of conflict had been almost wholly eliminated and that it had been possible to reap the full benefit of the exceptional value of the group meetings. Good attendance at the group meetings is even more important than at the general meetings and since results were so very satisfactory a good deal of enthusiasm in the smaller assemblages was evinced. In concluding his report Mr. Sutermeister suggested that co-operative work in the association be pushed to the limit.

VOCATIONAL EDUCATION REPORT

The report of the Committee on Vocational Education was given by Chairman R. S. Hatch of the Hammersley Manufacturing Company. It was primarily a statement of the financial condition of the organization, a report of progress in the editing and distribution of text books, and a summary of what members could do to

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aid the work of the committee. Between January, 1921 and January, 1922, $22,729.14 was subscribed by mills in the United States, and $21,517.72 by mills in the membership of the Canadian Pulp and Paper Association, making a balance of $44,246.86 collected to date. The expenses in the same period amounted to $41,334.17 leaving a balance of $2,912.69 of which $432 is held by the Technical Association and the balance of $2,480.69 by the Canadian Pulp and Paper Association. From April 1 to the completion of the committee's work there will be required $7,000 to complete the text book program. Of this sum $2,000 is at hand leaving a balance of $5,000 to be raised by the mills. There will be no direct assessments but in view of the great worth of the committee's work it is hoped that little difficulty will be encountered in accumulating the balance.

GREETINGS FROM OTHER ASSOCIATIONS

At this juncture of the meeting President Raybold of the American Paper and Pulp Association entered and since his time was limited President Williamson gave him the floor immediately. He extended the greetings of the American Paper and Pulp Association to the Technical Association in a few brief and opportune remarks. H. H. Reynolds, president of the Salesmen's Association of the B. D. Rising Company and J. H. O'Connell, president of the Superintendents' Association, followed with brief remarks which lent much color to the session.

For the Committee on Service to Members Wm. Clark, of the General Electric Company, spoke on the great interest manifested in the subjects of the drying of paper and beating methods. He requested that more co-operation be tendered the committee in the matter of filling out questionnaires.

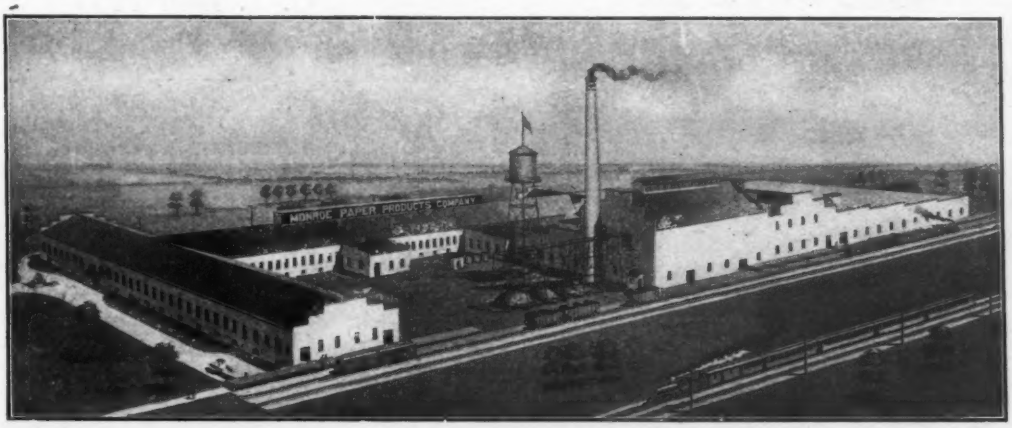
OTHER COMMITTEE REPORTS

George Harvey, chairman of the Special Committee on Felts reported the progress of the work and mentioned the need of co-operation with the Salesmen's Association. E. S. Catlin reported for the Special Committee on Depreciation, and stated that a written report would be forthcoming on the subject within thirty days.

The report of the Auditing Committee of which W. W. Crockhite of the General Electric Company is chairman concluded the business session which was followed after a brief intermission by a paper on "The Technical Man and the One Best Way of Doing A Job" by Frank B. Gilbreth of Montclair, N. J.

NEW BOARD MILL OF MONROE PAPER PRODUCTS CO.

The Monroe Paper Products Company was organized in February, 1920, with a capital stock of $1,000,000—all of which has been paid in. The officers are: W. R. Harris, president; W. M. Sawyer, first vice-president; T. I. Ilgenfritz, second vice-president; R. M. Sperry, secretary; G. A. Blum, treasurer, and they with the following comprise the board of directors: Wm. G. Gutmann, Ed. G. J. Lauer, Geo. M. Martin, all of Monroe, and Dr. Jas. T. Upjohn, of Kalamazoo



PLANT OF THE MONROE PAPER PRODUCTS CO., MONROE, MICH.

The company purchased an 80 acre tract of land in Monroe, Mich., adjoining the Pere Marquette Railway, and installed 1,800 ft. of side track. The over all dimensions of the buildings are 500 ft. x 224 ft.

The board machine is a Beloit Iron Works—six-cylinder type giving a 112 inch maximum trim and capacity of 65 to 70 tons of paper boxboard every 24 hours.

The other machinery, aside from the board machine, comprise—Nine Dilts beaters, connected in pairs to motors belt driven; five Shartle Jordans direct connected to motors; the power plant comprises a battery of three 400 h. p. McNaul horizontal water tube boilers with Detroit stokers. A 24 x 42 Hamilton Corliss engine is directly connected to a General Electric generator for generating the company's own electrical power. There also is a bank of transformers consisting of 1,000 kva for using Detroit Edison power.

The plant started production September 3 and manufactures the following grades of paper box board: Plain chip, test chip, test jute liner for corrugated and solid fiber board, single manila lined chip back or skimmed news back, bleached manila lined chip back or skimmed news back, mist gray, green, or tan chip back or skimmed news back, colored suit box boards, solid news, filled news, or news vat lined chip, white vat lined chip.

TO MANAGE AMERICAN-CANADIAN PULP CO.

W. Ward Smith of Spring Valley, L. I., who has been secretary to Governor Miller of New York ever since he took office a year ago last January, is to quit the State's service on April 17, to become general manager of the American-Canadian Lumber and Pulp Company, with offices in New York City.

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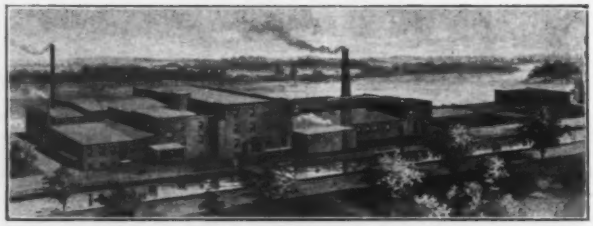

WATERFORD, NEW YORK, MILL

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GROUND WOOD PULP

T. A. P. P. I. Papers and Reports

Presented at the Annual Convention of the Technical Association of the Pulp and Paper Industry at the Waldorf-Astoria, New York, April 11-13, 1922—Representative Men of the Industry Discuss Various Important Problems of Timely Interest

The Power Plant of the Paper Industry

Read at the Annual Meeting of the Technical Association by A. G. Darling and H. W. Rogers

Like many other things, the pulp and paper industry is accommodating itself to the change in costs markedly noted since the Great War began. It is not particularly strange that the managers of the mills are calling for more strict economies in the power plant than before. While the power and steam costs are only a small proportion (5 to 11 per cent) of the total cost of product, yet they are well worth investigating, especially since the result tends to reduce the cost of other portions of the process and toward a general increase in efficiency. Of the two primary sources of power in the industry, heat and fall of water, the cost of the former has undergone the more radical change. Fuel has risen some 100 per cent, while kinetic water power has increased only a comparatively small amount.

There is hardly a process in the paper industry that does not require steam in some degree; the result being that each pound of paper necessitates from 4.0 lb. to 6.85 lb. of steam before it is finally shipped.

The mechanical energy necessary to produce the paper from logs as delivered amounts to 0.0437 h. p. per pound of paper.

The Heat Balance in the Paper Mill

The problem then is to combine these two requirements, heat and mechanical energy, in the most economical manner. Where water power is available at a cost lower than the cost of any combination of heat and mechanical energy, it should be utilized to its fullest extent. If there is not sufficient water power for the mill necessitating a supplementary supply from steam, that steam should be used as to obtain the maximum benefit from it.

Modern practice tends toward the use of higher steam temperatures and pressures. It is true that equipment for such costs more but on the other hand the economies from the steam using equipment generally warrant the additional expenditure.

The highest pressure necessary in paper mill processes is used in digesters, usually from 80 to 100 lb. gauge. In the past this has been supplied direct from the boilers, and quite rightly, too, as boiler pressures have not been sufficiently high to develop the energy between them and the digester pressures. With pressures and temperatures of the order of 250 lb. gauge and 200 degrees superheat, however, there is an attractive field of energy which should not be overlooked between boiler and digester pressure.

To neglect the energy between boiler pressure and pressures required for drying, heating and bleaching, is to throw away a fair proportion of the coal pile every day. This has been recognized to a certain extent as is evidenced by the use of non-condensing engines exhausting into the process steam mains. The difficulty found with this arrangement is that the demands for mechanical energy do not always yield the quantity of steam required for process work. Generally there is a feast or a famine. The over supply exhausts to atmosphere or feed water, requiring excess water to condense it—both of which are wasteful, whereas the under supply must be made up from throttled high pressure steam which gives temperatures higher than necessary.

It is not unusual to find steam issuing from the dryer rolls of paper machines, when there is still 80 to 90 per cent of the heat left in the steam and more wasted by having to pump cold water to condense this steam.

A heat balance can be obtained and further maintained by the application of properly designed equipment.

For example let us take the usual boiler plant conditions—steam at 150 lb. gauge practically dry with sufficient condensing water to be used where necessary. In this steam there are the following heat values assuming boiler feed water to be at 200° F:

From 200° F. to 212° F.	12 B. t. u.
From 212° F. water to 212° steam	970 B. t. u.
From 212° steam to 358.5° (150 lbs. Ga.)	223 B. t. u.
	1,205 B. t. u.

It is easily seen that the major portion of the heat is that of evaporation—80.5 per cent. Supposing process steam is used at 20 lb. gauge, there are available 49 B. t. u. (1205 — 1156) of heat. It is worthy of note also that out of 1,156 B. t. u. in 20 lb. gauge steam 84 per cent is available in merely condensing that steam to water which should be done in paper machine dryers and heating systems rather than in the feed water by extra cooling water.

The demands for steam in process are fairly constant for drying and heating though it is not unusual to find paper machine operators shut off their steam valves when a break occurs and opening up rather fast when the paper is again running. If pulpers or bleach boilers are included in the demand the requirements for steam vary rather widely, being of the order of 30 to 50 per cent of the total used in that process. It is this variable demand which requires special attention and will be discussed later.

Let us assume a given mill and discuss the possible means of meeting the demands. For instance, a 100 ton per day mill is a general size and it gets its product from 80 per cent groundwood and 20 per cent sulphite.

The mechanical power requirements will be approximately as follows:

Table I—Mechanical Power Required in Process

Groundwood.	
Wood Room	88 H. P.
Grinder Room	5,613 H. P.
Sulphite.	
Wood Room	100 H. P.
Screens, Pumps, etc.	137 H. P.
Machine Room.	
Beaters, Jordans, Pumps, Machine, etc.	1,475 H. P.
Finishing Room	35 H. P.
Machine Shop	50 H. P.
Super Calenders	1,250 H. P.
Total	8,748 H. P.

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HIGHEST GRADE FOURDRINIER WIRES

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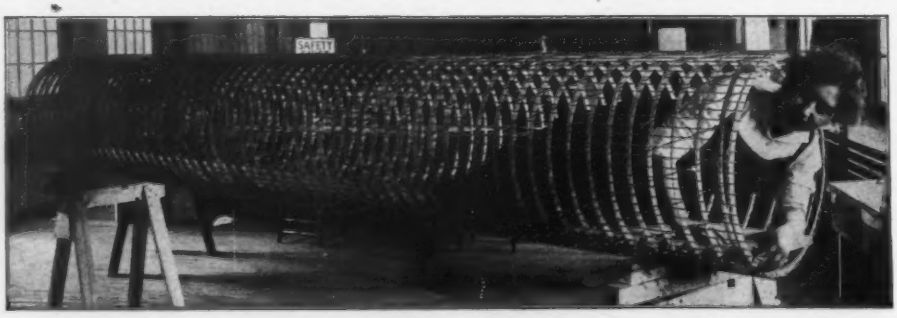


Any Length *Any Diameter*

WATERMARKING OF EVERY DESCRIPTION

To combine all the elements, it may be assumed that sufficient hydro-electric power is available to operate the wood and grinder rooms, the balance of the power coming from steam.

It is further assumed that the drive is as follows:

Alternating-current motors used throughout the mill for power purposes, except on the paper machine, with synchronous motors on the grinders and jordans; the paper machines to be equipped with the direct-current sectional type of drive, with synchronous motor generator set for supplying the power. In this case, low pressure steam will be required for drying.

The steam requirements will be approximately as follows:

Table II—Steam Used in Process

Process	Lbs. steam per lb. paper	Pressure lbs. Gauge	Average lbs. steam per day	Lbs. steam per hr. Avg.	Max.	Min.
Cooking	.6— .75	80—100	135,000	5,630	19,700	3,840
Beating	.6	20	20,000	834	2,000	....
Drying	3. —4.75	20	775,000	32,300	40,300	16,000
Heating	.3—1.25	20	155,000	6,450	19,600	....
Total	4.0—6.75	..	1,085,000	45,214	81,600	19,840

Assuming an average motor efficiency of 84 per cent, distribution loss of 5 per cent and load factor of 38 per cent on the supercalenders and 80 per cent on the balance of the mill, the average load on the generators becomes 5,800 k.w.

The steam requirements for process and heating will vary from about 82,000 lbs. per hour to 20,000 lbs. per hour, according to the time of year and the requirements of process.

There are several ways of furnishing the process and heating steam. Since our boiler pressure is only 150 lbs., and our digester pressure is between 80 and 100 lbs., we will assume that there is not sufficient heat energy available between the boiler and the digester pressure to transfer it into mechanical energy. This leaves available the steam which contains usable energy between 150 and 20 lbs. pressure. The amounts vary from 62,000 lbs. to 16,000 lbs. per hour.

There are various methods of utilizing the energy in this steam before it is passed to the process mains. For the purpose of this discussion only two methods will be mentioned.

Steam turbines are similar to compound engines in the fact that they utilize the steam in stages corresponding to the various pressure cylinders of the engine. Likewise, a turbine can be made to operate condensing or non-condensing, and further can be designed to operate condensing while simultaneously emitting steam which retains some of its original energy, having given up the balance to accomplish work in the turbine. This is accomplished by extracting steam after it has passed through the first stage. The remainder of the steam develops its full energy by passing through the subsequent stages on its way to the condenser. As both parts of the turbine depend upon the quantity of steam passing through them for the energy to drive the generator, it is necessary to automatically control the steam to the throttle and the pressure of the steam extracted. This can be accomplished most economically by an internal valve between the first and subsequent stages. As both the electrical load and the extracted steam requirements may vary, a governor is required to regulate the speed of the unit. Here, then, is a device which will produce electrical energy in any quantity up to its limit of capacity and simultaneously utilize the difference in pressure between boiler and process to supply some part of the electrical load, so saving the necessity of generating high pressure steam to accomplish the equivalent work and an additional amount for throttling to process pressure. It also provides the exact amount of steam required for process, except for a small quantity required to maintain the temperature of the latter stages. It gives constant speed, which is primary in the manufacture of all grades of paper.

Under the conditions assumed, the average amount of process steam will develop approximately 750 k.w. The groundwood and grinder load being supplied from hydro-electric power, there is left a balance of 1,050 k.w. to be generated by steam passing through the entire turbine to the condenser at a very economical rate.

The second scheme—that of non-condensing turbine to develop the energy of the process steam between boiler and process pressure—will also give approximately the same electrical energy. This machine, floated on the hydro-electric generator and the condensing turbo generators, which must be installed to make up the required energy supply, need not have a speed governor, but should have an overspeed safety trip device and a back pressure regulator. It will then give an electrical output in proportion to the amount of process steam passed through it. Its economies will be slightly better than the extraction turbine upon the same steam basis, but in many cases the cost of a non-condensing and a condensing turbine will exceed that of a single extraction turbine to give the same results.

Where some other source of energy is available in sufficient quantities to absorb the fluctuating supply from the process steam going through the non-condensing machine, and where that other energy is less expensive than energy from a condensing turbine, the non-condensing unit should work to considerable advantage.

Either of these schemes include the feature which is most important—a reliable source of electrical energy with automatic control of process steam. Emphasis cannot be laid too strongly on the necessity of using all the heat put into the steam by the boilers. Methods have been developed and used successfully for many years of condensing the process steam in the process so returning only water to the boilers at a temperature most suitable to the boilers for feed water.

The Electric Boiler

A number of paper mills are so fortunately situated that they have excess water power available during portions of the year. With spare generating capacity, this energy has recently found a new market for itself within the paper mill. Excess water power can be substituted for fuel at almost any time and place. Electric boilers are the outlet for excess power.

The efficiency of such boilers can be made 96 per cent, or better. The operating force per b. h. p. is comparatively small. Such equipments have been successfully used in Sweden and other places where hydro-electric power is inexpensive. It requires about 350 k. w. h. to generate 1,000 lbs. of steam. The cost of electricity should be below 8½ mills per k. w. h. in order that a saving be made over coal generation, coal costing $5 per ton. Excess power from hydraulic sources seldom cost such a figure, while coal often reaches $5 per ton.*

The Hydraulic Plant

One of the results of the increased fuel and labor costs is the corresponding increase in water right values. A number of hydraulic plants find it economical to rehabilitate their equipments by tearing out the antiquated machines and putting in modern equipment, which shows an increased efficiency up to 30 per cent, depending upon the age and condition of the old equipment, and also upon the possibility of more complete usage of the power available at the site.

In this connection, a brief reference to the more recent developments in hydraulic apparatus may not be amiss.

There has been a marked increase in the number and total horsepower of water wheels in the past few years which has given the inspiration for improvement in efficiency and increase in size of wheels.

The progress is shown in Table III.

Table III

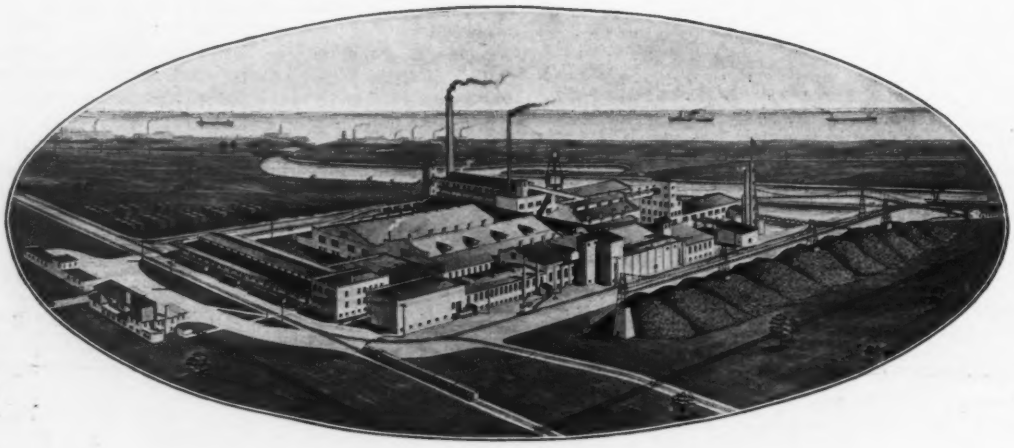
Date	Maximum Unit Horsepower	Total Horsepower Developed in the U. S. A.
1900	5,000	650,000
1910	18,000	2,900,000
1920	55,000	8,200,000

The progress in efficiency has been correspondingly great, amount-

*For more complete information, see "Electrically Heated Steam Boilers," by E. A. Lof. General Electric Review, Vol. XXIC, page 515. Also paper by Horace Dreer presented at this convention.

Detroit Sulphite Pulp & Paper Co.

DETROIT, MICHIGAN



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One Fourdrinier machine, 80 inch, manufacturing plain and striped Wrappings, Twisting, Coating, Waxing and Envelope Papers, Specialties in natural and colors.

Two Yankee machines, 120 inch, manufacturing Tissue Papers, Machine Glazed Waxing and specialties.

Mill and Sales Offices: Detroit, Mich.

ing to a gain of some 13 per cent since 1900 at best points, while fractional load efficiencies have been increased to an even greater extent, for example, from 27 to 40 per cent at half load.

Of the more recent improvements in design, perhaps the change in draft tube construction and increase in specific speed has been the most marked.

Several of the water-wheel manufacturers have adopted draft designs tending to regain the energy existing at the discharge of the runner.

The claims made are that the increase in specific speed allows an increase in actual speed, so reducing the cost of direct connected generators and giving general economies in space and size of parts.

One example of the new application resulted in an increase from 133 to 150 r.p.m. in a 60-ft. head, 11,000 horsepower installation that is now being made.

New and better types of runners for low head plants, prevention of leakage and corrosion around the seal rings, are among the other recent improvements.

Tail water level control has been a subject to which a great deal of attention has been given in the past, resulting recently in several schemes which promise more or less relief from loss of head during flood conditions. Nearly all of them attempt to reduce back water by an auxiliary stream to that coming from the runners, forcing the water away from the tail race of the runners. Some add the ejector principle to the power stream by passing an auxiliary stream through the draft tube.

These improvements all tend to increase the rate of depreciation on old machinery, at the same time making it possible to show cause for replacements and hitherto uneconomical developments.

Automatic Hydro-Electric Generators

Perhaps one of the greatest factors entering modern economies is made possible by the elimination of constant attention to hydro-electric and electrical sub-station equipment. We have become accustomed to pushing the button and seeing things happen over which we have no direct control beyond starting and stopping. We have not satisfied ourselves, however, that increased labor costs and decreased results are justified. We know how we want things done and are willing to pay a reasonable amount to see those things accomplished in the manner specified. Your engineers are capable guarantee that the result will be what is expected, or when re- men who can instruct their subordinates, but no human power can peated will always give the same result. Machinery, to a large extent, merely accomplishes repeatedly the physical interpretation of some human desire. Parts wear out and need replacement, sometimes get out of adjustment, yet we are able to accomplish many things repeatedly merely with supervision instead of actual operation.

The governor was one of the first automatic devices which made water-wheel and steam-engine operation successful. Relays on electrical circuits are the masters constantly ready to relieve dangerous conditions. Remote control of motors, elevators, oil switches, and so on, has been an accomplished fact for some time. It is, therefore, not a very long step to place similar devices on water wheels, generators, exciters, motor generator sets and rotary converters. In fact, there are now in successful operation—without constant attention—eleven automatic hydro-electric generating stations, besides about as many more on order.

A total of approximately one hundred sub-station equipments are now in operation and about as many more on order. These latter equipments control motor generator sets, rotary converters, and their attendant apparatus.

The pulp and paper industry utilizes an enormous quantity of water power; some sites being conveniently located for attendance, some located some distance away from the mill, and others not being developed because of the high operating expense.

The automatic hydro-electric station offers a means for economical power not heretofore deemed possible. It will develop reliable power with minimum attention. It is accomplished by accurately repeated operations in accordance with schemes developed by men familiar with requirements and equipment. Practically all water-wheel and governor manufacturers have entered the field enthusiastically, with the result that co-ordination between hydraulic and electrical parts has been secured.

Summarizing the power situation in the pulp and paper industry, as well as others, it is not extravagant to say that in the face of the increased costs of materials, labor, and money, the engineers of the present day can and are meeting the problems with a grasp that assures realization of profits.

Report of the Committee on Sulphate Pulp

By Carl Moe, Chairman

Owing to the depressed business conditions there has been very little activity in the sulphate pulp industry during the past year. Most of the plants have been entirely or partly shut down. The stagnating condition created by this situation naturally has not been favorable to technical developments, and your committee has not been able to produce any papers for presentation at this meeting.

When the present committee had been appointed, some suggestions were made in the first report submitted to the association as to what phases of the sulphate pulp industry it would be worth while to investigate, in order to improve the process generally. The committee has endeavored to collect information along some of the lines indicated, and papers have been presented covering "Rinman Modification of Sulphate Process," "Elimination of Bad Odors from Digester Blow," "Evolution of Lime by Causticizing Test" and "Utilization of Lime Sludge as Fertilizer."

Committee's Work Appreciated

Inquiries made to the author of some of these papers by interested parties outside of the association seem to indicate that the attitude of the public toward the committee's work is appreciative.

There are, however, a good many other problems pertaining to the manufacture of sulphate pulp which profitably might be subjected to systematic research, of which the following may be mentioned as an example.

Investigation Desirable

The so-called Kraft paper, which now absorbs a greater part of the output of the wood pulp made by the sulphate process, was originally made in the Scandinavian countries by under-cooking the pulp and disintegrating the fibre bundles by kollergangs. Later on kollergangs were abandoned and, with a somewhat more thorough cooking, the disintegrating and hydration performed by beaters, either of the ordinary type, or with bars made of basalt lava or special castings. A recent communication from Sweden, however, conveys the information that beaters, in turn, now have been abandoned for kollergangs, almost universally, in production of Kraft paper. This repeated changing forward and back between two so different systems, as far as can be judged, has been decided on for empirical reasons only, without any rational analysis of the factors involved. It would be greatly desirable to investigate systematically the effect of different kinds of beating as well as of different kinds of cooking on the hydration of the fibers and on the properties of the resulting paper, such as elasticity and resistance to bursting, tearing and folding.

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are made of clean, new rags in a finely equipped mill, by specialists who have had a long practical experience.

FIDELITY ONION SKIN (*Watermarked*)
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A System of Records to Maintain Uniformity of Basis Weights of Paper

Read at the Annual Meeting of the Technical Association by Parker K. Baird, Technical Engineer, Spokane, Wash.

The value of any system of control and record of the uniformity of basis weights of paper is best measured by the results obtained. It must show accurate results to satisfy the management; it must be obviously fair to interest the paper maker, without whose co-operation little can be accomplished since it is a check and record of his personal efficiency; and, it must be a digest of the day's work on each paper machine to help the busy superintendent and from which he can get at a glance just the information that is constantly being required of him.

Any variation in the basis weight of paper causes loss to the manufacturer and in many cases extends even through to the point of consumption, as is instanced in the loss in copy production to the publisher if the paper runs over basis weight. Of course, there are trade customs governing the amount of variation allowable for each grade, yet if advantage is not taken of a control system a loss is sure to occur to the manufacturer. In many cases he doesn't know of this loss due to absence of an accurate record system. These facts are well known to the industry, yet perhaps more generally neglected than any other item in paper manufacturing.

"How much paper do we give away each year?" asks the manager. "What constant weight can my company guarantee our customers, and, in case of controversy, what ready, exact records of weights and corresponding original samples have we for reference?" asks the sales manager. Again asks the superintendent, "Are my men running the paper the proper weight while I urge for greater production, and which man gets the highest production running his paper the proper weight?" These questions are often asked, but not always answered satisfactorily in the industry.

Consequently, the need of such a system of control and record is evident in many mills. Such a system should be extended in its details only to the point where the desired results and data as a record are obtained. In small mills only the simplest record showing the quality of the paper from the standpoint of weight should be used, while in large or high-grade mills, extensions can be made to cover all the operations of the machine room and qualities of the paper. An endeavor to explain a system applicable to an average mill will be made by outlining a mode of procedure and by presenting a resultant machine record in exact form.

General Procedure

A.—Taking a set of representative samples from the reels or rolls during the previous day or shift.

B.—Gathering samples and machine room data.

C.—Arrangement of samples in sequence, noting if any are missing.

D.—Preparation of a preliminary guide from which to make adding machines "slip."

E.—Making of "slip."

F.—Checking of weights by rapid method for "scale error."

G.—Correction of sample weights by individual weighing if found incorrect by "scale error."

H.—Correction of erroneous weights on "slip" as found after individual correction.

I.—Deductive calculations for each division of shift, as average basis weight, etc., as shown in the illustration.

J.—Calculation of daily and accumulative averages, as shown in the illustration.

K.—Calculation of laboratory tests after making same from representative part of samples for day or shift. And, accumulative averages of tests, if desired.

L.—Contract monthly statements showing average basis weight to date.

Detailed Procedures

With similar reference lettering to previous general outline.

A.—As in any analysis, the accuracy of the results obtained is determined by the care of sampling, which should be studied and suited to the machine and grade of paper being made. As many samples may be taken as is desired, but the customary quantity is as many as will tear conveniently to weigh-sheets across the machine. These samples should be taken regularly, torn to size, folded, stamped, weighed, dated, timed, signed, and placed in sequence as taken from the reels. A sample box providing pigeon-holes the proper size for each shift should be near the scales stand and should be protected from any unusual atmospheric conditions in the machine room which would change the moisture content of the paper. This, of course, cannot be completely prevented, but can be regulated fairly constantly and that constant in the form of a maximum limit error used later in checking up the samples.

B.—Each morning the samples from the previous day's run are gathered and taken to the laboratory or office where the work is to be done on the machine record. In case of a testing man on each shift, the work of making the preliminary "slip" can be done simultaneously with the control tests and all that remains is to have it typewritten to form and posted or filed. When gathering the samples, any machine room data, as speeds, production, order numbers, contract runs, must be studied in order to choose the proper group of samples from which to draw averages and file samples.

C.—In the laboratory the samples are arranged in sequence, noting any missing samples, and grouping samples according to shifts, order numbers, colors, or various weights as the occasion arises. These are arranged in separate packs, one for each of the three machine tenders, and the weights copied off the samples for the next step, D, by thumbing through the packs.

D.—The preminary "guide" should be as abbreviated as possible, as, for instance, in copying weights all that is necessary is to pencil down in a column, say, 2.0 instead of 32.0, omitting the 3. To make the rough preliminary guide from which to copy the weights on the adding machine, start with the machine tender's name, then the order number, grade, color, weight and size, followed by a single column of weights, broken as is necessary to show changes in order number or weight or grade that were made on that tender's shift. The other two tenders can be arranged similarly beside this column.

E.—The "slip," as shown in the table, is an extended adding machine slip. Start the slip with the machine number and date. Leave space sufficient to fill in grade, color, order number, and machine tender, and then start copying, with a cleared machine, the weights in order as they were written on the preliminary guide. At any places where samples are missing leave a space, and use subtotals for each order number and space for calculation, if necessary. Then after each tender's total, leave a larger blank for extension figures, as shown in the illustration. This is then followed by similar space for the next shift of samples, and after that a third set, completing the weights for that day. After the last set of weights, a much larger space is left for Parts 2 and 3, as shown in the illustration.

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The following Dependable Papers carried in stock at mill for immediate shipment;

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ALLIED PAPER MILLS

Kalamazoo, Michigan

BARDEEN DIVISION KING DIVISION MONARCH DIVISION

10 PAPER MACHINES
34 COATING MACHINES

MACHINE RECORD NO. 2

[Adding Machine Slip]
STEINMAN
No. 746
STANDARD NEWS
BLUE WHITE
24x36—32/500
3.05
3.15
3.15
3.08
(Omitted)
3.20
3.20
3.22
3.10
140.56*

Avg. 11 reels	31.95
Over 33	11.4
Under 31	11.4
Unfy. 30.5-35.0	85.9
Basis aim	95.0
Score	86.0
Tons	11.48e

No. 748
STANDARD NEWS
BLUE WHITE
24x36—31½/500
3.20
3.20
3.15
3.15
(Omitted)
3.20
3.20
3.12
3.18
50.99*

Avg. 4 reels	31.87
Over 32½	6.3
Under 30½	0.0
Unfy. 31.0-33.2	93.0
Basis aim	63.0
Score	83.2
Acc. score	84.50
Tons	5.52e
Tons per shift	17.10
Speed	609
Scale error	—.10

(Continued at top of column)

PAYNE
No. 746
STANDARD NEWS
BLUE WHITE
24x36—32/500
3.10
3.20
3.05
3.05
(Omitted)
3.35
3.22
3.22
3.28
141.41*

Avg. 11 reels	32.14
Over 33	15.9
Under 31	15.9
Unfy. 30.0-34.5	85.9
Basis aim	86.0
Score	80.0
Acc. score	77.53
Tons	13.86m
Tons per shift	14.82
Speed	609
Scale error	.20

SCHRAEDER
No. 748
STANDARD NEWS
BLUE WHITE
24x36—31½/500
3.30
3.28
3.30
3.10
(Omitted)
3.00
3.10
3.18
3.18
189.37*

Avg. 15 reels	31.56
Over 32½	18.4
Under 30½	11.7
Unfy. 29.0-34.2	83.5
Basis aim	94.0
Score	82.5
Tons	15.81n

(Continued at top of column)

SCHRAEDER
No. 749
STANDARD NEWS
BLUE WHITE
24x36—32/500
3.20
3.25
3.22
3.10
12.77*

Avg. 1 reel	31.92
Over 33	0.0
Under 31	0.0
Unfy. 31.0-32.5	95.3
Basis aim	92.0
Score	95.8
Acc. score	77.93
Tons	1.06m
Tons per shift	16.91
Speed	609
Scale error	.19

2 AVERAGES

Spokesman, 32	31.92
Acc. spokesman, 32	32.19
22 reels No. 746, 32	32.04
19 reels No. 748, 31½	31.62
1 reel No. 749, 32	31.92
Basis weight 32-31½	31.85
Speed	609
Prod.	47.72
Acc. prod	48.04
Hours down	1.00

3 TESTS

S. N. 32	32.03	10.71	29.0
S. N. 31½	31.62	10.46	28.6

F.—To check the weights by the rapid method for "scale error," or the number of pounds each tender has mis-marked his samples erroneously or wilfully, it is only necessary to weigh the whole pack from that tender on a drug balance and multiply the weight in grams by the factor, 1.102, which converts grams into pounds on 500 count (500/453.6 = 1.102). This actual weight, as expressed in pounds is taken as the standard, and is the sum of all the sample weights if correctly marked. Against this standard, check the sub-total weight on each tender, as shown on the slip. To illustrate, "Steinman's" set of samples weighed 1,743 grams on a drug balance and this multiplied by 1.102 gave 1,921 lbs., which was the actual pound weight. The sub-total, as shown for Steinman's samples, was 1405.6 lbs. plus 509.9 lbs., or 1915.5 lbs., which is 6 lbs. less than standard, or, on 60 samples, each sample has a "scale error" of — .10 lbs. In this case the tender did not greatly undermark his samples, but if the error per sample runs greater than — .15 lbs., an individual check is made of his samples. The upper limit is set at .25 lbs. As was previously indicated, this would allow a maximum error of 9 lbs. on 60 samples caused by marking the samples too light or by taking on moisture. Hence, if the 9 lbs. limit were exceeded, or — .15 as a scale error, the conclusion could be reached that wilful mis-marking of the samples had occurred, the scales setting had been tampered with, or the samples had taken on moisture, which, of course, would not happen where supervision is close. In case of a plus error, the indications are that the samples have been marked too heavy or that they have lost moisture. It is important to check the scales setting regularly by use of a combination of chemical balance weights totaling 30 grams. This should read 33.06 lbs. on the 500 scale. It is not always true that a scale will read correctly at the point of use, around 32 lbs. in the case of news print, when the hair on the pendulum is set at zero when empty. This can be caused by varying torque friction in the bearing and sometimes faulty counterbalancing in manufacture. This rapid method of checking paper weights saves many hours per day which would be necessary if each individual sample were checked. It is almost conclusive, as there would be no object for the tenders to mark their samples heavy, under which tendency most paper is made due to the desire for high production. On the other hand, there is a tendency to mark samples light, and this rapid method shows it at once if they even mark as many as two sets one or more pounds light on an average day's run.

G.—If the "errors," as found, exceed the certain plus and minus limits set for each particular mill, it is then necessary to locate the mis-marked samples and re-mark them.

H.—The corrected weights must then be carried to the "slip" and the sample weights changed to correspond, as well as similar changes in sub-totals and grand totals affecting all averages.

I. The extensions or deductive calculations necessary to show the true quality of a run of paper are summed up in the "score." This score is an average of three qualities: "basis aim," "uniformity," and "in margin." These items will be explained in order as they appear on the machine record.

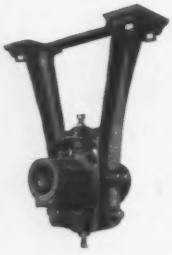
The *average basis weight* (Avg.) for the block of samples, followed by the number representing the reels sampled and by the actual average weight of these samples, is calculated by dividing the sub-total, 1405.6, in the first block of samples, under "Steinman," by the number of samples, or 44, giving 31.95.

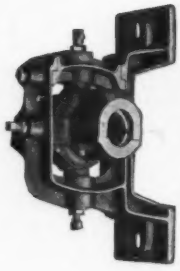
The "*over* 33," allowing one pound over as a "margin," represents the percentage of samples "over margin," while "*under* 31" represents the percentage "under margin," which happens to be 11.4 per cent in each case. Hence, 22.8 per cent of the samples, or the paper run, was "out" of margin, or 77.2 per cent "in" margin. *"In margin"* shows the percentage of weights that are run within the trades custom margin, which is generally about 3 per cent, according to the grade. On a 32 lbs. news sheet, this allows approximately 1 lb. over or under 32 lbs., as indicated by "over 33" and "under 31" on the record.

CLEVELAND TYPE

HILL COLLAR OILING BEARING

(Patented)



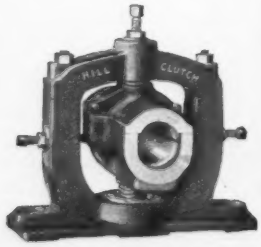


Such universal satisfactory service has been obtained from our Standard Type Hill Collar Oiling Bearing that it would be hard to convince many of our customers that any other design could be superior.

Since placing upon the market, several years ago, the new Cleveland Type we have manufactured both designs, leaving it to our customers to decide which they preferred. After several years our experience, and that of our customers, has demonstrated that the Cleveland Type is the better and more popular line.

The mountings have all been re-designed and contain many improvements, the natural results of an accumulated experience of thirty-eight years.

Although we appreciate that there are some who would say that it is not good business judgment to disturb a satisfied customer, our experience, after manufacturing both types for many years has been such that we recommend the Cleveland Type, not only to new customers, but also to our old customers who have been obtaining most satisfactory service from our older Standard Type Bearing.



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MACHINE RECORD—NO. 2. MARCH 7, 1922

STEINMAN.
No. 746
STANDARD NEWS
BLUE WHITE
24x36—32/500

30.5	31.5	31.5	30.8
30.5	31.0	31.5	30.5
31.5	32.0	31.8	31.5
33.5	35.0	34.0	32.5
31.0	31.5	31.5	31.0
31.0	31.2	31.0	31.0
32.5	33.5	33.0	33.0
32.5	33.0	33.5	32.0
32.5	32.0	33.0	32.0
32.0	32.5	33.0	31.5
31.5	31.5	31.8	30.5

Avg. 11 reels	31.95
Over 33	11.4
Under 31	11.4
Unfy (30.5-35.0)	85.9
Basis aim	95.0
Score	86.0
Tons	11.48e

No. 748
STANDARD NEWS
BLUE WHITE
24x36—31½/500

32.0	32.0	31.5	31.5
32.5	32.0	32.0	31.0
32.0	33.2	32.0	31.2
32.0	32.0	31.2	31.8

Avg. 4 reels	31.87
Over 32½	6.3
Under 30½	0.0
Unfy (31.0-33.2)	93.0
Basis aim	63.0
Score	83.2
Acc. score	84.50
Tons	5.52e
Tons per shift	17.10
Speed	609
Scale error	—.10

PAYNE.
No. 746
STANDARD NEWS
BLUE WHITE
24x36—32/500

31.0	32.0	30.5	30.5
34.0	32.0	32.0	32.2
32.8	30.0	31.0	32.0
34.0	32.0	32.5	33.0
31.2	30.8	30.5	30.5
33.8	32.0	32.5	32.0
33.0	32.0	31.0	31.5
34.5	33.5	32.8	34.2
32.5	33.0	31.5	32.8
32.2	31.5	30.8	31.8
33.5	32.2	32.2	32.8

Avg. 11 reels	32.14
Over 33	15.9
Under 31	15.9
Unfy (30.0-34.5)	85.9
Basis aim	86.0
Score	80.0
Tons	13.86m
Tons per shift	14.82
Acc. score	77.53
Speed	609
Scale error	.20

SCHRAEDER.
No. 748
STANDARD NEWS
BLUE WHITE
24x36—31½/500

33.0	32.8	33.0	31.0
29.5	31.0	32.0	31.2
33.0	32.5	33.0	31.5
34.2	33.5	33.0	32.5
32.8	32.8	32.2	32.0
32.5	31.5	31.5	30.5
31.0	30.2	29.0	29.2
32.0	32.5	32.0	31.0
31.8	32.5	31.0	30.8
32.2	32.2	31.5	31.0
31.5	31.5	30.8	29.8
31.0	31.0	30.8	30.0
31.2	31.5	30.5	30.5
32.0	32.8	30.8	30.5
30.0	31.0	31.8	31.8

Avg. 15 reels	31.56
Over 32½	18.4
Under 30½	11.7
Unfy (29.0-34.2)	83.5
Basis aim	94.0
Score	82.5
Tons	15.81n

No. 749
STANDARD NEWS
BLUE WHITE
24x36—32/500

32.0	32.5	32.2	31.0

Avg. 1 reel	31.92
Over 33	0.0
Under 31	0.0
Unfy (31.0-32.5)	95.3
Basis aim	92.0
Score	95.8
Acc. score	77.93
Tons	1.06n
Tons per shift	16.91
Speed	609
Scale error	.19

2. Averages:

Spokesman 32/31.92	1 reel	749	32/31.92
Acc. spks. 32/32.19	22 reels	746	32/32.04
Avg. basis wt. 31.85	19 reels	748	31½/31.62

Acc. production	48.04 T
Production	47.72 T
Hours down	1.00

3. Tests:
S. N. 32/32.03 10.71#/29.0 S. N. 31½/31.62 10.46#/28.6 S. F.

"*Uniformity* (Unfy.), followed by the lowest weight and the highest weight, shows the maximum width of variation in the samples. The value is found by getting the width, or 4.5 lbs. in case of "Steinman 746 lbs.," and dividing this width by the basis weight, 32 lbs., and subtracting the quotient from 100 per cent, giving 85.9 per cent of perfect uniformity, which would mean that all samples were 32.0 lbs.

"*Basis aim*" is found by getting the difference between the basis weight and the average weight of all samples and dividing this difference by the margin allowed on that grade, as 1 lb. over or under, and not 2 lbs., as might be indicated by the total width of the margin above and below basis weight. Subtract this per cent from 100, or perfect aim, and the "basis aim" is found.

The "*score*" is the average of these three items: "basis aim," "uniformity," and "in margin" percentages. Hence, it will be seen that the "score" of a machine tender is an average of how near the basis weight his run averages, how uniform it is in weight, and what parts are within the allowed margin.

The "*accumulative score*" (acc. score) is carried on a sheet from day to day, with the totals to date, and number of days from which it can be quickly calculated by adding the new score and dividing by one more.

The "*tons*" is taken from the machine books, and "*tons per shift*" is an accumulative average kept on a sheet for that item, with totals to date.

The "scale error" is calculated at the time of checking of the sample weights and is recorded on the slip at that time.

The *small letters*, "m," "e," and "n" are to show the morning, evening and night shifts, and allowances can thus be made for variances in production when observed by the management.

J.—For the calculation of daily averages on the various grades, colors, or weights, the corresponding sub-totals are used and record is made under "2. averages" on the machine record. This section of the record shows the *daily average basis weight* for that machine, which is very important in many statistical calculations. It is calculated by weighing the number of reels made at each weight and in this way is an exact average basis weight. This can be carried by monthly accumulative averages if so desired. To show how the day's average basis weight is calculated the following series of calculations are given: 44 samples at 31.95 totals 14,056, 16 at 31.87 gives 5,099, 44 at 32.14 gives 14,141, 60 at 31.56 gives 18,937, and 4 at 31.92 gives 1,277. The grand total is 53,510; divided by 168 samples gives an average basis weight of 31.85 for the day. Balanced in the same way, it will be noticed that the order numbers No. 749 and No. 746, both 32 lb. paper, averaged 32.03" for the day. These calculations can be shortened by the use of sub-totals and grand totals, as shown above and are found on the adding machine slip.

In the laboratory are kept the various sheets carrying from day to day totals of scores, contract averages, tons for each tender, accumulative average productions, speeds and any other items desired. These are brought up to date at the time the "slip" is prepared each day.

K.—*Tests* are shown on each grade and weight with as many instruments as are used. In the case of the Mullen tester in popular use, a value has been developed in our laboratory showing the relative strength of any two weights or grades of paper. It has been called the "*strength factor*" (s. f.), and is very useful for an exact comparison of two sheets of different weights. It will be noticed under "3. tests" on the machine record illustration, that the grade is shown abbreviated as "s. n." for standard news, followed by 32, which is the desired basis weight. After that figure,

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separated by a slant bar, is the actual weight, 32.03, of all 32 lb. paper made that day. Then follows the Mullen test in pound per square inch, 10.71 lbs., which is separated from the strength factor by a slant bar. This arrangement is the shortest that has been developed to show the data.

The *calculation of any "strength factor"* for any weight of paper is not difficult. Divide the Mullen test, 10.71 lbs. (which latter figure was obtained by quartering all the samples and selection of a representative part and testing), by the weight of paper calculated to a 25 x 40—500 area and multiply by 100 per cent. In this case, 32.03 lbs. on 24 x 36 becomes 37 lbs., using factor 1.157 for 24 x 36—500, on 25 x 40, which divided into 10.71 lbs. gives 29.0 per cent. This value is independent of weight and, consequently, when compared with the 31½ lbs. s. n., which had a strength factor of 28.6 per cent, it can be immediately concluded that for some reason the 32 lb. sheet was proportionately a slightly stronger sheet of paper. This factor is particularly valuable in comparing the strength of papers as expressed by their test values when they are quite different in weight. All calculations being based on the 25 x 40—500 ream, it makes possible the direct comparison of a 32.03 lb., 24 x 36—500 sheet, having a s. f. of 29.0 per cent with a 45 lb., 25 x 38—500 book sheet having a s. f. of 38.0 per cent. By inspection it is difficult to arrive at a direct comparison.

Samples for reference are kept in a dark room and are selected as follows: If four samples are taken across the machine, the packs from each tender are quartered so that the first column as shown on the machine record is set aside, labeled with the mill order numbers, machine tender, date and any other data. The three remaining packs are used for laboratory test samples and given to the superintendent and management for observation as to color, finish, formation or any other detail in quality.

L.—*Contract monthly statements* are often valuable to show the exact average of the paper sold on a definite weight guarantee. Where the weights do not run uniform, any slight variation from the basis weight where hundreds of tons of paper are used, makes many tons lost to the publisher with no printing surface, and consequently the number of copies of newspaper of a standard size printed per ton drops down with a proportionate increase in postage per copy. The monthly sheet showing the average basis weight of samples from various runs that apply on a certain contract should be weighted with the tonnage to show how many tons over or under the guaranteed basis weight the paper has run to date and with care the contract can be closed satisfactorily to both parties.

Hydrating Machinery for the Paper Mill

Read at the Annual Meeting of the Technical Association by George L. Bidwell, Warren Mfg. Co., Riegelsville, Pa.

We are indebted to some member of the Technical Association for the following definition of hydration:

"In every day language hydration is defined as the gelatinizing of the fiber by taking on water. Hydrated fibers are gelatinous and swollen. They offer resistance to water passing through them, and the more they are hydrated the more resnstance they offer. Hydration gives to a mixture of pulp and water characteristics similar to those possessed by a viscous fluid. The degree of hydration as measured by viscosity is a very important indication of the condition of the stock."

The Object of Beating Paper Stock

Having before us such a good definition of "hydration," it is easy to see that the object of beating paper stock is to attain a certain degree of hydration. This varies with different grades of paper. The hydration of the fiber is controlled first by the consistency of the furnish, and with the consistency of furnish under control, the degree of hydration next depends upon the condition of the bars in the beater roll and the bed plates. When more than one beater is used for a paper machine it is highly important that every beater roll be in good condition. The pressure of the roll on the bed plate is measured by "rule of thumb" if mechanically driven. With electric drives this pressure is measured by the ammeter reading. With the rolls in good condition and all having the same bucket capacity, the beater man can gauge very accurately what he is doing.

Most every paper maker is looking for a cheaper way to hydrate stock and at the same time find a more accurate control of the degree of hydration. In a recent issue of *Paper* we find an article which leads us to wonder if sometime, in the near future, our beater rooms will be cleared of the heavy ponderous equipment of today and be replaced by apparatus that will give the desired result by chemical treatment.

Chemical Hydration Not Yet Practiced

Chemical hydration has not yet been put in practice in the paper mill. The stock packer has heard a little something about this theory. He used to send us bone dry harbor rope but since learning that fiber soaked in water 24 hours will start hydrating without the aid of any mechanical means, he now aims to give the paper maker harbor rope with at least 15 per cent moisture int it. Furthermore, many have standardized on this amount of moisture and sanction the packing of harbor rope with 15 per cent of moisture. If we find more than 15 per cent of moisture in harbor rope, the packer is summoned. He explains that when the rope was packed, he did not know its destination and thought it would be shipped to some paper maker who has more advanced ideas on the value of water as an aid to chemical hydration.

The machinery builder is also trying to help out in a mechanical way. An attachment is now on the market that can be placed in any Hollander, beater or washer. It is claimed that this attachment doubles and trebles circulation without additional power. Circulation is at the rate of from 50 to 120 feet per minute at a consistency of from 9 to 12 per cent and that an engine so equipped will do the work of three ordinary hollanders. Other advantages claimed are low cost and small amount of floor space, cheaper beater room construction and a superior quality and finish of product.

Same Problem Whatever the Furnish

Raw material of great variety is used in making paper. The following stock consumes enormous quantities of power in the hydrating process: harbor rope, jute fibers, new overall cuttings, new linen and cotton threads, and cotton linters. Fibers of this kind are used in the manufacture of rope, jute and rag specialties where strength is the dominating factor. We next have sulphate pulp and hard sulphites. The power consumption is somewhat less on these fibers, but they produce very good wrapping paper and some high class specialties. Soda pulp and the softer sulphites require still less power but are very useful in producing certain characteristics in a sheet of paper. All these fibers may be bleached or unbleached. Whatever the furnish, the problem is the same. We must attain the desired degree of hydration of the fiber with the least possible consumption of power and the hydration must be carried to the same degree in every beater of stock prepared for a given grade.

The following beaters are advertised as power savers: The Niagara, Shlick, Rabus, Umpherston and the Universal.

Let us tell you how bleaching with

Liquid Chlorine

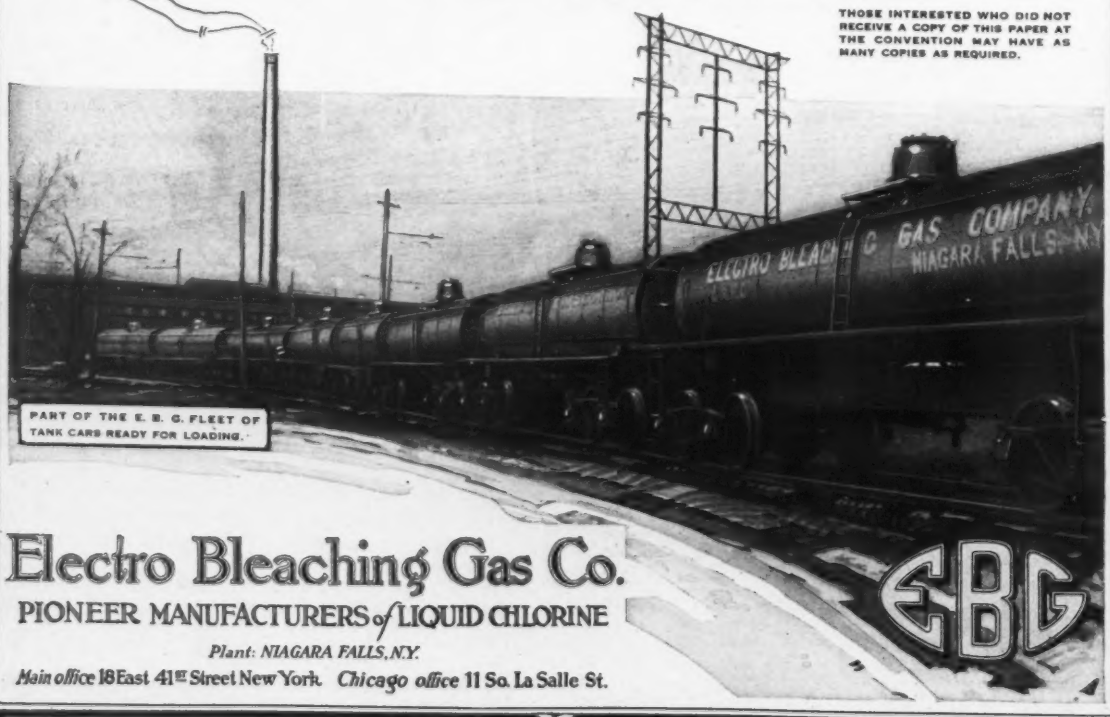
Saves Freight - Eliminates Sludge Wastes - and Decomposition Losses -

E. B. G. TANK CARS AT CUSTOMER'S PLANT.

A TANK CAR OF LIQUID CHLORINE AT UNLOADING SHED—SAME PLANT.

PRODUCING BLEACH LIQUOR WITH LIQUID CHLORINE IN THE PULP OR PAPER MILL.
BY S. W. JACOBS AND H. P. WELLS OF THE TECHNICAL STAFF OF
ELECTRO BLEACHING GAS COMPANY —

THOSE INTERESTED WHO DID NOT RECEIVE A COPY OF THIS PAPER AT THE CONVENTION MAY HAVE AS MANY COPIES AS REQUIRED.



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What Beater Makers Are Trying to Do

Almost every manufacturer of beaters can give you many reasons why his beater roll will outwear any other on the market. It may have the bars shimmed in and secured with bands of superior steel; or it may be a bandless beater roll with bars held by keys, dovetailed slots, dovetailed lugs, slotless bars, wedges and lock nuts. All this shows an effort in the right direction. They are trying hard to give the paper maker an indestructible beater roll. One that will have the same cutting surfaces and bucket capacity every day in the year. One in which the wood filling will not raise. When they accomplish this, you will find, if you use a half dozen beaters to supply a paper machine, that they will all bring the stock to the same degree of hydration in a given length of time. It will be necessary to furnish them all the same consistency and apply the same amount of pressure on the bed plate. These two elements are already controlled in a modern beater room. A speedometer shows the surface speed of the stock and ammeter shows the amount of pressure applied to the bed plate. What you must have is a perfect beater roll in every hollander that supplies your machine. If you decide to do it with one of the new type beaters that move a stiff consistency stock at a high surface speed. this roll should be indestructible and present the same cutting surface to the stock continually. If you use several standard hollander beaters, all the more reason why you should have indestructible beater rolls.

Until recently, standard wood and steel fillings were used in washers, beaters, Claflins and jordans manufactured by some of the best builders of paper mill machinery in the country. These standard fillings are now being superseded by what is considered indestructible material. This came about as follows:

In November, 1919, we read in *The Paper Industry* this statement credited to N. C. Nash of the Lakeside Paper Co.:

Fifty Years Behind the Times

"My opinion is that the best machinery on the market at the present time for refining stock is fifty years behind the times, being all out of proportion, great power and labor consumers and one of the largest factors in the high cost of paper manufacture.

"I believe that improvements for machinery of this kind have been neglected and given less thought than any other machinery in the world, and believe a better product could be manufactured at a greatly reduced cost, a large saving of steel, iron and fuel and a great reduction of labor.

"Let us all get together and give this part of the mill a little study and formulate our views, then submit them to the paper machinery builders, they are the boys who will try and give us what is needed. We must start immediately or we will drift along in the same old rut for another fifty years."

Use of Manganese Steel

This message from Mr. Nash struck the writer very forcibly as did also an advertisement issued at this time by a steel plant. This advertisement shows a mammoth cast steel gear wheel which was said to have been used to drive placer gold dredges in California. The steel was described as manganese steel and the advertisement went on to give its many good qualities which checked up with just what the paper makers need for washer bars, beater bars and filling for Claflin continuous beaters and jordan refining engines.

We soon got in touch with the steel plant and by January, 1920, we had in use a 48 in. x 48 in. washer roll made of this material. The blades are cast integral with segments which are riveted to spiders mounted on the shaft and no wood pieces at all are used. It was put to work without grinding at the mill as it was ground with abrasive wheels to a true circle at the steel plant and fitted nicely the circle of our bed plate. After two years' service we cannot find any perceptible wear. Manganese steel was invented by Robert Hadfield, a leader in the British steel industry, and has been made in this country since 1892, but its application to paper machinery is new. The steel is very tough, presenting the same cutting edge day after day. We have uniform bucket capacity for lifting the stock over the backfall so that the same surface speed can be attained in every beater. This roll has been adopted as standard for all our washers and beaters as we consider it mechanically and chemically indestructible.

After proving that this metal was the best that could be had for paper making, we had the same steel mill get out liners and homogeneous plugs for our Claflins, beaters and jordan refining engines. As in the beaters, the blades are cast integral with the plugs and liners and no wood pieces are used in the construction. We find this filling runs without vibration. We use direct connected motors running the Claflins and jordans. The ammeter reading shows the amperes according to the nature of the stock being refined. High speed could not be attained with a wood filled jordan as the vibration would loosen the filling. In August, 1921, we started a new four cylinder paper machine on rope and jute paper. This machine has six 1,000 lb. washers, six 1,000 lb. beaters, two continuous Claflin beaters and two jordan refining engines following it. The entire equipment is manganese steel. The results obtained with this equipment are very gratifying and we are now rebuilding an abandoned plant and giving it the same kind of equipment.

Some Advantages

The steel plant referred to in this paper is located at High Bridge, N. J., and is known as the Taylor-Wharton Iron and Steel Company. They build hydrating machinery for the paper mill. The beater and washer rolls have the following advantages:

(a) The roll is practically indestructible.

(b) The roll bars show so little wear that the tackle is practically the same every day in the year. This results in uniform paper. Too much stress cannot be given to having a uniform tackle. Roll bars that hold up their edge and are not easily battered result in uniform product. The beaterman knowing the condition of his tackle, and it being practically the same every day in the year, is able to do much more accurate work. In fact, his work becomes nearer an "exact science."

(c) The character of manganese steel in the segmental bar tends to "draw" the fiber more, and as the edge is in such good condition, considerably less power is consumed in producing a given degree of hydration.

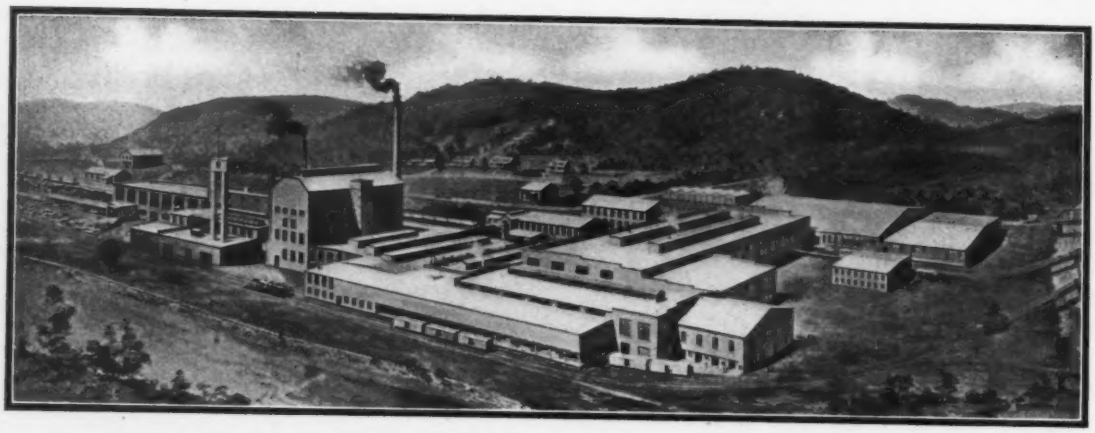
(d) The absence of wood filling in the roll insures the same bucket capacity as there is no trouble from raised fillings. There is no repair or mill-wright work to be done on the roll. It goes to work without any grinding as the roll is finished to a true circle in the shop.

(e) The manganese tackle can be used on the finest papers as it does not rust but takes on a "battleship gray" color except for the cutting edge which stays bright and highly polished. There is no metal found in the finished paper that is traceable to manganese bars.

(f) Where heat must be applied to the beater, the roll will last a lifetime, as it cannot be affected by heat. Manganese steel is very tough and durable, standing up under and enduring the corrosive and abrasive action of chemicals and contact with the bed plate.

(g) The paper produced using manganese beater and washer bars is superior in strength, finish and general appearance to paper made with the ordinary steel bar and wood filled beater roll. This has been proven on rag, rope, jute and wood papers.

Johaneson, Wales & Sparke, Manhattan, have incorporated under New York State laws, with capital stock placed at $100,000, to handle wood pulp. The incorporators are G. S. Webster, Jr., W. M. Wilson and A. M. Hanson. The attorney is G. M. Spencer, 120 Broadway, New York.



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Modern Lighting for Paper and Pulp Mills

Read at the Annual Meeting of the Technical Association by J. H. Kurlander, Edison Lamp Works, Harrison, N. J.

The most cursory review of the history of paper-making is all that is necessary to impress on one the tremendous strides made since the ancients first manufactured paper by separating, arranging and combining the fibres of the papyrus reed.

This progress is due, in the main, to the invention of mechanical devices, which serve to reduce to a minimum the manual effort required to produce the finished article. The natural outcome of these inventions is represented by a vast increase in production and betterment in quality of modern paper over that made by our forefathers.

But inventions alone could never have wrought such changes in the paper-making industry as witnessed in the past few score years. Correct and scientific application of all factors which determine the success of the enterprise are also vital. The most ingenious creative efforts of man are worthless if the results of these efforts are not effectively and efficiently applied to the task at hand, which brings us directly to the purpose of this paper.

The Necessity for Good Lighting

In view of the fact that operation is continuous in many departments of the paper mill, and that the production of artificial light has at last reached the stage where it is one of the cheapest commodities in plant operation, the paucity of even reasonably good lighting installations in this field is surprising. It is true that during the past several years some of the most progressive mills have awakened to the possibilities in this direction, and have made radical changes in the method of lighting their workrooms.

If, for no other than humanitarian motives, good lighting is essential in reducing to a minimum accidents to even careful workers, but an injured employee is not the sole loser. The loss is reflected back to the employer in the form of compensation indemnities, loss of the worker's time, temporary loss of time by the injured employee's co-workers and demoralizing effect on them, and in case the accident should prove fatal, a conscience, troubled by the thought that he will be held indirectly responsible.

A discussion of the benefits of good lighting would fill a volume in itself, and as the indications are that the paper industry is at last realizing its shortcomings in this respect, an enumeration of some of the primary benefits of modern lighting will suffice. These are: Safer working conditions, increased production in manual and semi-manual operations, reduction of eyestrain, improved morale, sanitary working conditions, a neater mill.

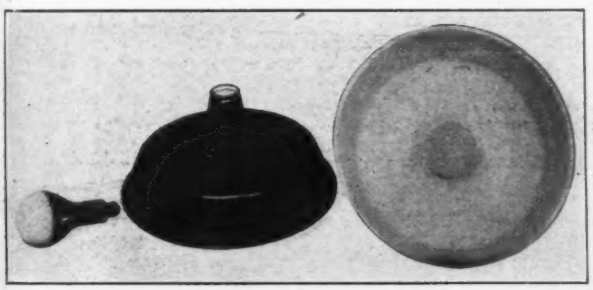

Fig. 1.

The RLM Standard Dome reflector and the bowl enameled lamp used in conjunction with it to diffuse the light and cut down glare.

What Constitutes Good Lighting

A potent factor in determining the success of a lighting system is the equipment used in securing the desired effects. The lighting art has reached such a point that general recommendations for a specific field can be made which are flexible enough to cover quite a wide scope of conditions. This is due, primarily, to the increased efficiency of the Mazda C lamp and also to a definite trend in the design of lighting accessories. To carry on work effectively under artificial light, certain factors must receive consideration.

The intensity must be high enough to permit rapid and accurate discernment of all objects within the ordinary field of view; glare, either from the units or from reflections from polished surfaces should be absent; the distribution of light should be reasonably even over the entire working area. The first two points will be automatically taken care of by the proper selection of lamps and reflectors, while the third is a matter of the installation design.

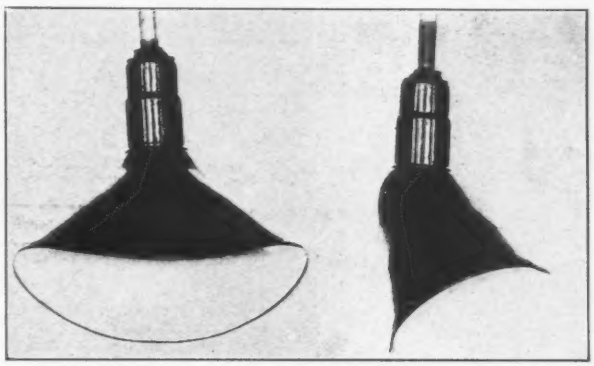

Fig. 2A. Fig. 2B.

For purely economical purposes, nothing could be better than to standardize on the use of a few carefully selected units. The variety of lamp sizes, too, should be kept at a minimum to facilitate replacement from stock. It is with this view in mind that some suggestions are here given on the selection of equipment. The following units were chosen as being best suited to meet the needs of the average pulp or paper mill. Their application will be discussed later on.

Fig. 2C.

Elliptical angle and angle steel reflectors suitable for use in machine and calendar lighting. The first two views above are of the elliptical angle reflector and the remaining views below show various types of angle reflectors.

In Figure 1 is shown a type of unit which has been accepted as a standard by eight of the leading reflector manufacturers of the country, and which is adaptable to fully 75 per cent of the average industrial lighting requirements. Some of its good points are—protection from glare, excellent reflecting properties, durable construction and protection of lamp from breakage. At the extreme left is shown a bowl-enameled lamp for use in conjunction with

The Birdman's View of the K. V. P. properties, looking northward. Note the 285 foot K. V. P. stack, watchdog of the Kalamazoo Valley, towering higher than the mountains; symbol of our ideals in the manufacture of

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this reflector. The enamelling serves to diffuse the light, thus softening shadows, and also to prevent eyestrain.

The units shown in Figs. 2A, 2B, and 2C will find their greatest application in machine room lighting, and are special units designed to give a good intensity on vertical surfaces, such as the sides of paper machines and calenders.

For office lighting or in the finishing room of mills, requiring careful and close visual inspection, the units shown in Figure 3 are most effective. The first unit is of the totally enclosed type, completely hiding the lamp from any point of view, while the second is a semi-indirect unit with a closed top of clear glass to facilitate cleaning and reducing light absorption due to dust coatings on lamp and reflecting surfaces.

Recommendations

It will be necessary at this point to distinguish between pulp mills and paper mills in order to give each separate attention.

Pulp Making

Most of the processes in pulp making, with the possible exception of some operations in rag pulp making, merely require light enough to insure safe working conditions. There is but little work which makes any exacting demand on the eyesight other than that of locating objects, turning valves on and off, handling material and making adjustments. The requirements can be met by what is known as a general lighting system, *i. e.*, units symmetrically located throughout the workroom, giving the intensity mentioned in Fig. 20.

The RLM Standard Dome reflector and bowl enameled Mazda C lamp, mentioned above, form an effective unit for this work. Of course, precaution must be taken to insure outlets being so located that aisles, passageways, platforms, local work areas and similar places are well lighted.

To facilitate the determination of the proper size unit for a given condition, the curves shown in Figure 4 have been derived. These are based on the performance of bowl enameled Mazda C lamps

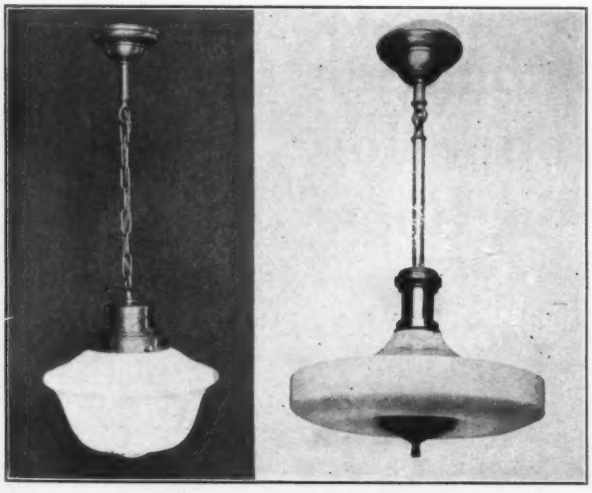

Fig. 3.

Two types of units which fulfill the requirements of office lighting. The first shows an enclosed unit, while the second is a view of a new type of semi-indirect unit with a clear glass top to prevent dust accumulations on the reflecting surface, and also to facilitate cleaning. Due to the quality of light these units give, they are particularly suitable for inspection room lighting.

in RLM Standard Dome reflectors under ordinary operating conditions. The method of using these curves is as follows: Determine from Table 1 the intensity desirable for the particular room under consideration. The ceiling height obviously governs the size of lamp—larger lamps can be used in rooms with a high ceiling and vice versa where the ceiling is low, small lamps more closely spaced will be necessary in order to prevent dense shadows. Subtract from the ceiling height two feet for length of suspension and also the height of the work above the floor. From the intensity value proceed horizontally until the vertical line at the given hanging height is reached. The heavy curve nearest this intersection will indicate the size of lamp, and the spacing is determined by reading the abscissae.

For conditions where the outlets are already in place, proceed upward from the spacing distance until the intensity line is reached and the size of lamp is then determined, first making sure that the hanging height is adequate for this spacing distance. For

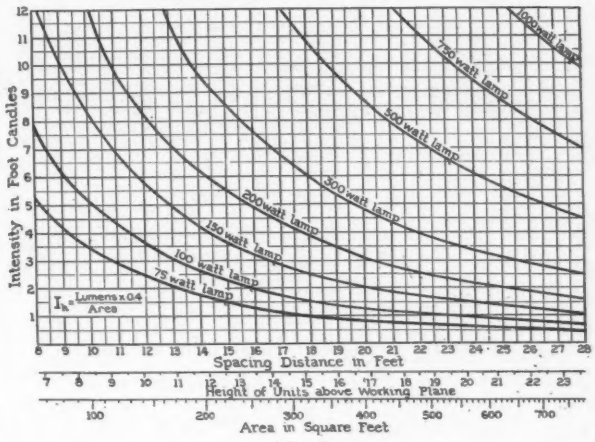

Fig. 4.

Curves showing the relation between intensity, a hanging height and spacing distance for various sizes of bowl enameled Mazda C lamps in RLM standard dome reflectors.

example, if outlets are spaced on 20 foot centers, the hanging height for uniform illumination would have to be at least 16 or 17 feet; if the ceiling is too low for this, additional outlets should be installed.

EXAMPLE. Suppose we have under consideration a wet machine room in a sulphite mill with a 20-foot ceiling height. The work is about three feet from the floor, giving us a hanging height of 15 feet (20—2—3=15). The intensity required is four foot candles. The horizontal line at four and the vertical line at 15, intersect at the 200-watt lamp curve, with a spacing of approximately 18 feet. Units will be placed at the corners of squares for sides of that length.

If a symmetric arrangement can not be obtained, a rectangular spacing can be used with the area of the rectangle approximately equal to the area of the corresponding square. Where but a single row of units is required, the same method is applicable with the width of the room as one dimension and the spacing distance determined from the proper area per lamp.

Where rooms are divided into bays by columns, it is naturally desirable to locate units symmetrically with respect to these bays. The number of units per bay will be dependent on the ceiling height. If a room were divided into 20 foot bays, with a ceiling approximately 18 feet, satisfactory illumination could be obtained with one outlet per bay; while if the ceiling were but 10 or 11 feet, four units per bay would probably be necessary.

Common sense must naturally be called into play in the location of outlets, as no two plants are exactly similar in layout, but the general methods given will apply. A typical arrangement for a rag room might be as pictured in Fig. 5, where the symmetric arrangement has been departed from in order to provide maximum light at the points where most essential. This is known as localized general illumination. With this system, there is always sufficient

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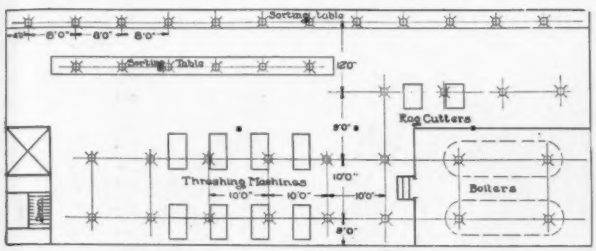

Fig 5

Plan of Rag Room Showing Location of Outlets.
X 100 Watt Bowl Enameled Mazda "C" Lamp in RLM Standard Dome Reflector.

spread of light to illuminate areas surrounding tables and machines.

The major processes under pulp making are ground roughly as follows:

Table I

Name	Recommended Intensity in Foot Candles
1. Saw mill	3.0
2. Wood room—	
(a) Pond room	3.0
(b) Barking room	3.0
(c) Chipping room	3.0
3. Sulphite Mill—	
(a) Digester house:	
Charging floor	3.0
Bottom floor	3.0
(b) Screen department	3.0
(c) Wet machine room	4.0
4. Soda mill—	
(a) Digester house	3.0
(b) Recovery room	3.0
(c) Evaporator room	3.0
5. Sulphate mill—	
(a) Digesters	3.0
(b) Recovery room	3.0
6. Ground wood mill—	
(a) Grinding room	3.0
7. Bleaching room	3.0
8. Rag pulp mill—	
(a) Sorting	8.0
(b) Thrashing	4.0
(c) Cutting	4.0
(d) Steaming	4.0
(e) Washing	(See beating)

Beater Room

In treating the lighting requirements of the beater room, the process of washing, which is ordinarily associated with pulp making, will also be considered, as these two operations are often carried on in the same room in mills using rag pulp stock.

Fig. 6.

Night view of a typical beater room, showing lighting conditions which are representative of present day practice. This installation, as a matter of fact, is even above that of the run of beater rooms, as in the majority of cases now reflectors are used. Intensity one-quarter foot candles.

Fig. 7.

Night view of a beater room equipped with a modern lighting installation. Compare this with the one pictured in Figure 6. Note that the entire room is lighted to a medium intensity and the utter absence of dark spaces makes work under such conditions more agreeable and safer. 100 watt Mazda C lamps in RLM Standard Dome reflectors, spaced on 16 by 18 foot centers, hung 14 feet high, are used. Intensity approximately 3 foot candles.

The first requirement of importance is that an intensity conducive to safe working conditions be supplied over the entire room. There seems to be a belief prevalent among some people that working conditions can be made safe by supplying bare drop lamps, or low wattage units placed at wide intervals, while yet others even adhere to the impression that artificial light of any kind is a rank superfluity and indicative of gross extravagance. While it is true that most of the work performed is fairly coarse and automatic in its nature and the time necessary for its performance cannot be varied, still were good lighting provided, the loading and unloading of the beaters, which is done by hand, could be speeded up. In Figures 6 and 7 are night photographs of two beater rooms, which were given the same length of exposure and taken under the same conditions. The effects under each are at once evident and require no further discussion.

The installation data for the proper lighting of beater rooms can be obtained from the curve shown in Fig. 4. A plan showing in detail the spacing of units for a typical case is shown in Fig. 8. An uneven spacing was adopted in order to prevent too large a vacant space around the edges of the room.

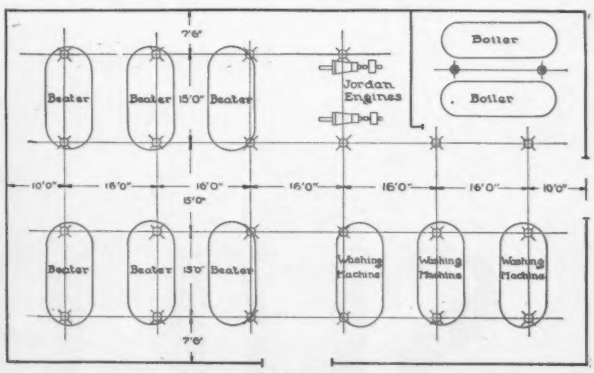

Fig 8.

Plan of Beater Room Showing Location of Outlets.
X 200 Watt Bowl Enameled Mazda "C" Lamp in RLM Standard Dome Reflectors.
⊗ 100 Watt Bowl Enameled Mazda "C" Lamp in RLM Standard Dome Reflectors.

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Machine Room

Unless considerable thought and care are exercised in designing the installation for the machine room, it is very likely that the lighting effects will leave much to be desired. The problems that present themselves here are far more complicated than those previously discussed, and hence more time will be devoted to their solution.

Fig. 9.

Night view of a typical machine room lighted by local units hung at various heights and placed without regard to workers' comfort and safety. Slippery floors, steps, platforms and obstructions constitute a direct hazard because of the dense shadows and low intensity. Average intensity well below 1 foot candle.

Even though the machine room usually receives the most attention in the average mill, still the result can be termed anything but satisfactory. Conditions such as those illustrated in Figure 9 can find no reasonable excuse for existence in these modern times, and yet they are representative of the average machine room. Dense shadows make it impossible to clearly see moving parts of machines or objects lying on the floor. The few light sources present are glaring and in some cases are hung so low as to be on a direct line with the eye. It is perfectly conceivable that a person mounting the steps shown in the foreground of this picture may look up and be temperarily blinded by the lamp at the top, lose his footing and fall.

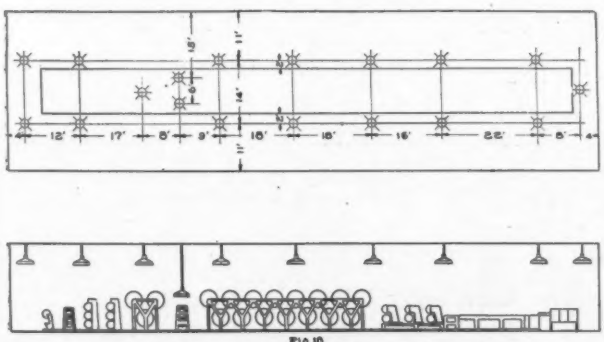


Fig. 10

Method of Employing Dome Reflectors for Machine Room Lighting. H 150 Watt Bowl Enameled Mazda "C" Lamp in R.L.M Standard Dome Reflector

Safety, however, is not the only consideration in this room, as poor lighting is directly accountable for loss of time as the workers are forced to exercise more care in their movements. Good lighting will give them confidence in their movements, and permit them to do more accurate work in less time. The lighting requirements are simple of statement but somewhat difficult of realization for the reason that the entire tending side of the machine presents a vertical surface which must be illuminated to a fairly high intensity.

Fig. 11.

A night view taken under the installation given in Figure 10. The entire room is lighted to a medium intensity, while the location of units places the strongest light on the working points. Average intensity approximately 4 foot candle.

The driving side must receive light enough to insure safe movement among the driving gears, belts or shafts, and its vertical surface must also receive a comparable amount of light. At the wet end, the screen, couch rolls and press rolls must be illuminated to facilitate inspection and adjustment. Where the paper is inspected after leaving the dryers, an intense light is required at

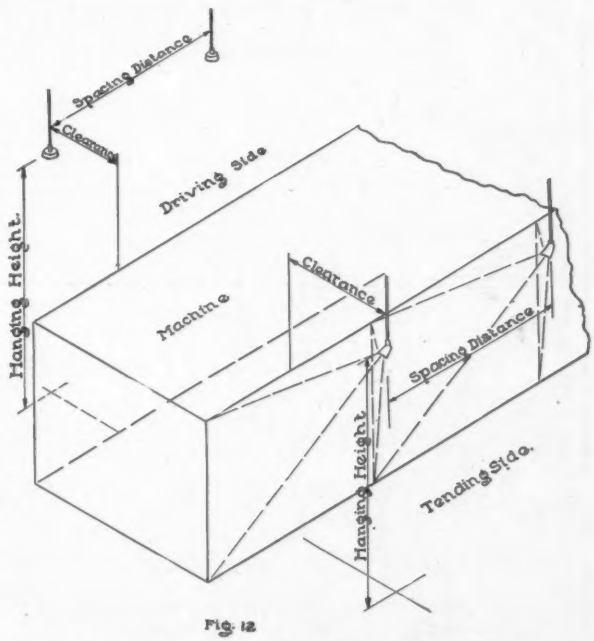
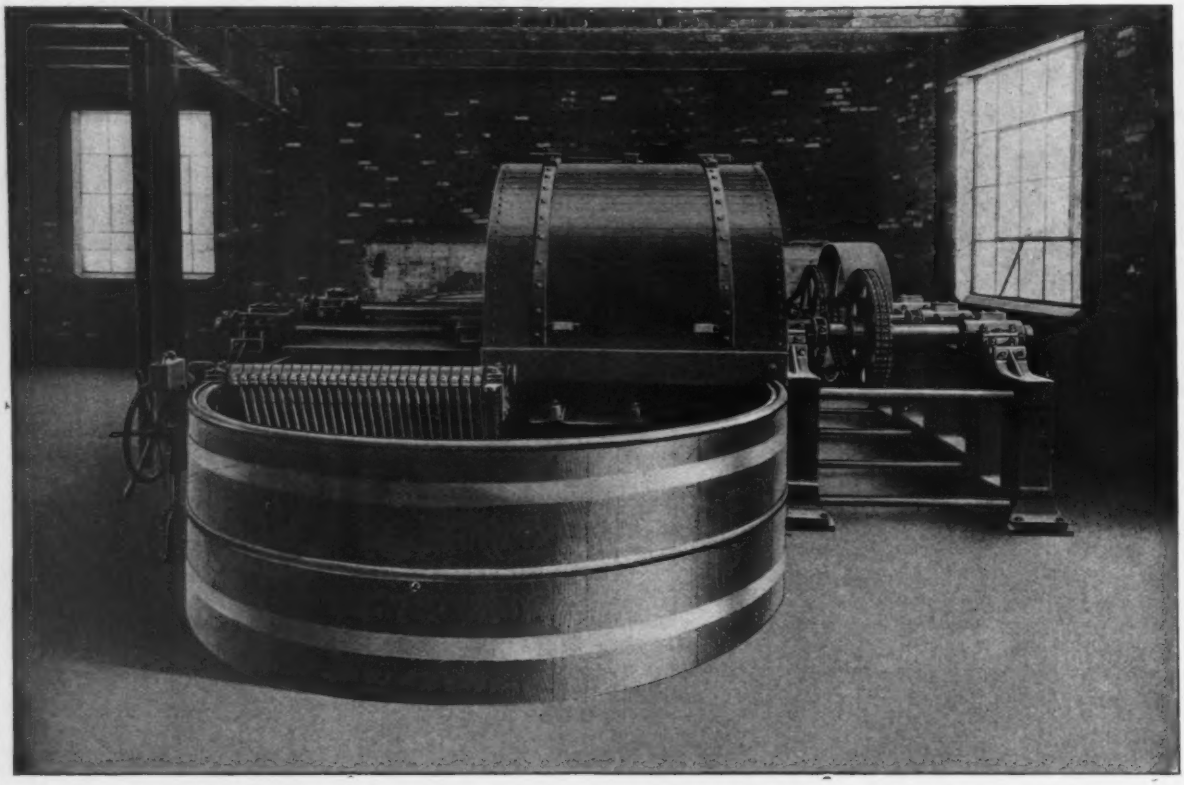


Fig. 12

Method of Employing Combination of Elliptical Angle and Dome Reflector Units for Machine Lighting.

A Typical Installation of Noble & Wood

PAPER PULPING ENGINE



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the inspection point. The vertical face of calendars and the slitters and winders should also receive a high degree of illumination, together with any other machinery present, such as weighing scales and sizing tubs, where the paper is machine sized.

There are, in general, two methods of lighting applicable—one, by a system employing bowl-enameled Mazda C lamps in RLM Standard Dome reflectors, properly spaced and hung; and two, by a combination of Mazda C lamps in RLM Standard Dome reflectors and elliptical angle reflectors.

The first method is useful where low machines, whose height averages 4 or 5 feet, are contained in rooms of low ceiling height

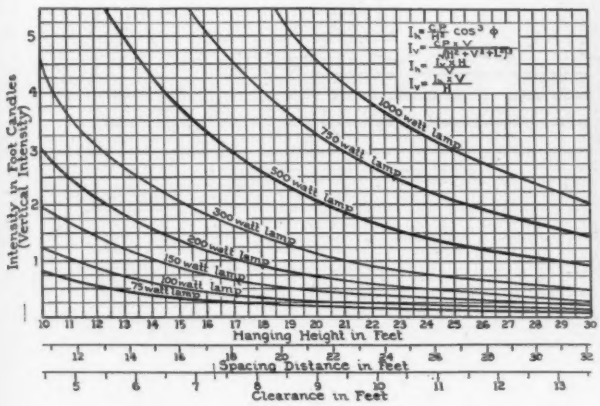

Fig. 13.

Curves showing the relation between vertical intensity, hanging height, clearance and spacing for various sizes of clear Mazda C lamps in elliptical angle reflectors.

(10 to 15 feet). It makes use of two rows of units, 2 feet away from the parallel to the sides of the machine, spaced so that the units will provide some light over the entire room, but the strongest light will be at the stragetic working points on the machine. Fig. 10 shows this in detail. The units should be hung about 13 to 15 feet high with the exception of units over the inspection point located just before the smoothing rolls. A night view of a machine room having such an installation is shown in Fig. 11. Where two machines are located in the same room, a row of units

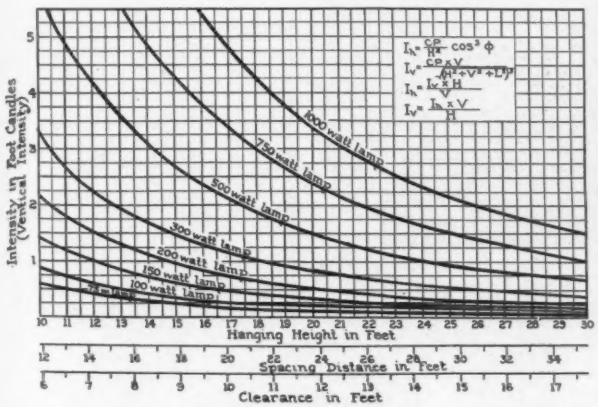

Fig. 14.

Curves showing the relation between vertical intensity, hanging height, clearance and spacing for various sizes of clear, Mazda C lamps, in angle reflectors.

can be placed over each driving side, while only one row will be required over the center of the tending isle, but these units should be approximately twice as powerful as those used on the driving side.

The second method of lighting should be used where the machines extend 6 feet in height; in brief this consists of placing a row of RLM Standard Dome units spaced uniformly over the driving side in a manner somewhat similar to that used with the low machines, but on the tending side a row of elliptical angle reflector units are mounted. This is shown in detail in Fig. 12.

Fig. 15.

Day view of a machine room where overhead obstructions make necessary extremely low hanging height of units. The design is correct in principle but stopped at the wrong point inasmuch as only 25 watt Mazda B lamps in elliptical angle reflectors are used. Hanging height of units is 8½ feet; clearance, 4 feet; spacing, 8 feet. Intensity on machine side well below 1 foot candle.

The clearance and spacing distance of units will vary with the hanging height which can be determined by subtracting approximately 2 feet from ceiling height. With this known, the curve in Fig. 13 should be referred to and the proper value of hanging

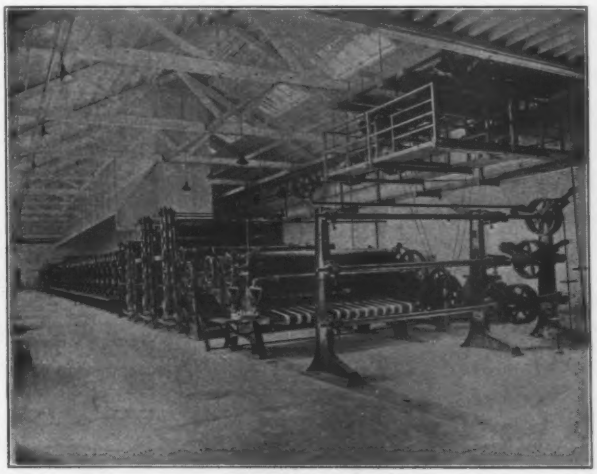

Fig. 16.

Day view of large machine room which employs the combination of elliptical angle and dome reflectors discussed in text. The installation data was unobtainable, but with the great hanging height used 500 watt Mazda C lamps are necessary to give the proper intensity on the sides of the machine. Note how the units are applied to calendar lighting. This is also described in detail in the text.

height noted on the scale marked "Hanging Height." On the two scales below this, will be found the proper spacing distance and clearance of lamps from machines for this height, while above this will be found lamp size curves which will permit a lamp being chosen to give the required intensity. As a matter of fact,

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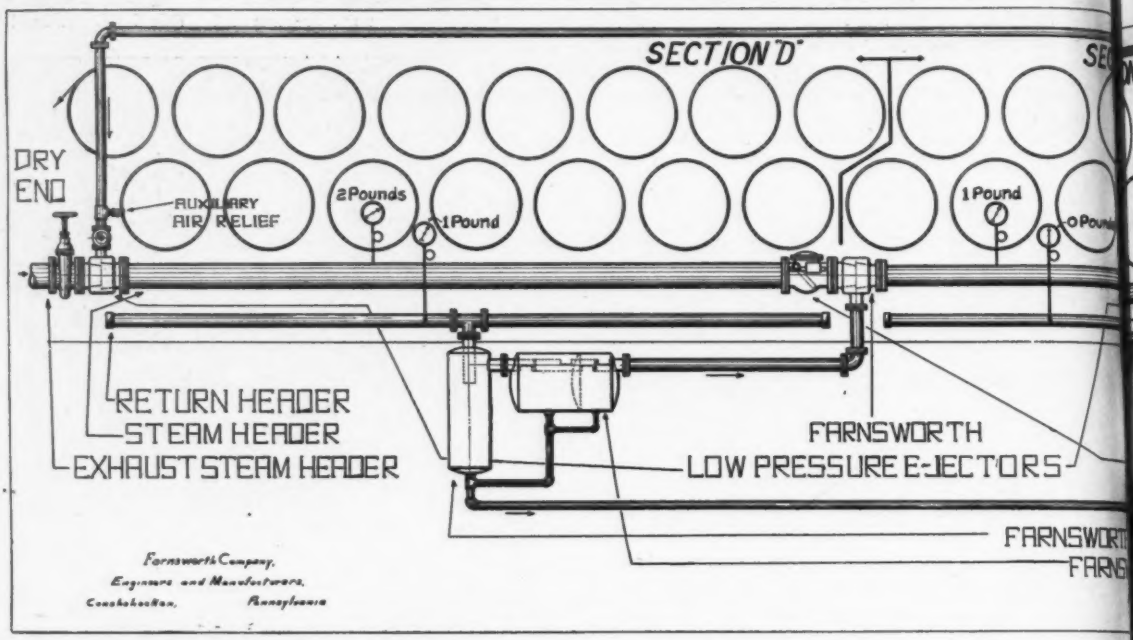

MULTIPLE EFFECT RE-EVAPORATION OF CONDENSATE

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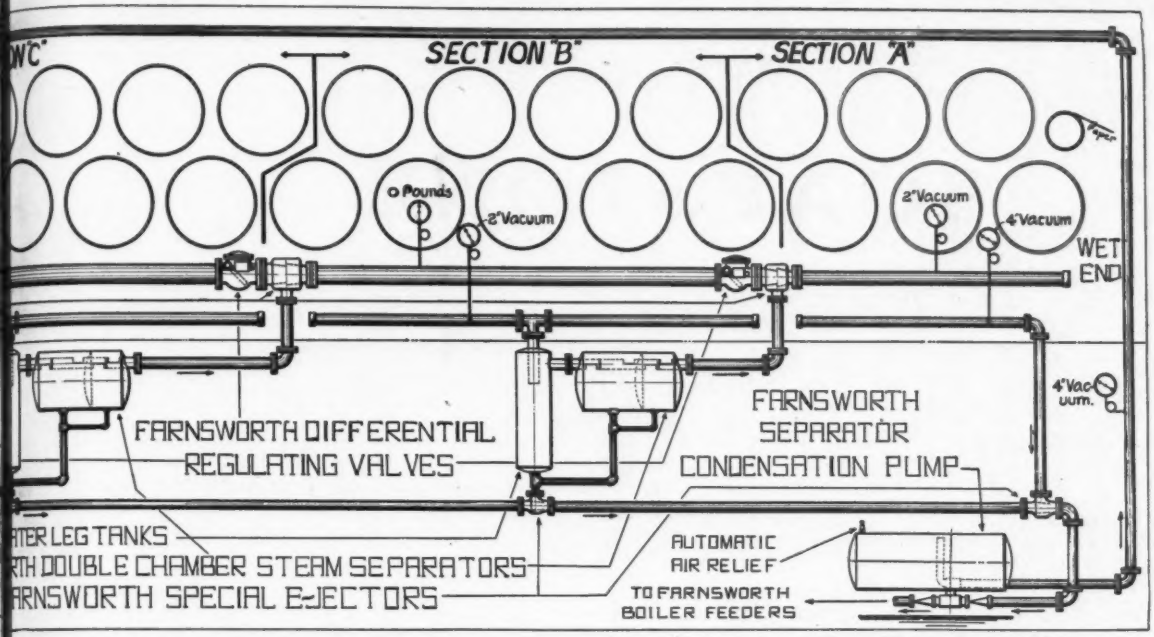

PROVIDES CONTROL AND GRADUATION OF TEMPERATURES

velocity of 7,000 to 14,000 feet per minute through the syphon pipes, pulling air, water and maximum heat transmission through the dryer surface with no fluctuation of temperature due control devices or hand control.

Explanation of System

Steam enters header section D. Passes into dryers, then out through the syphon pipes or buckets to section D return header. Water is separated from steam in water leg tank and the Farnsworth double chamber steam separator. The dry steam passes to section C steam header. This causes a drop in pressure between steam and return header of section D. If regulating valve between section D and C is set at 1 lb., this drop in pressure of 1 lb. will cause a velocity from 7,000 to 14,000 ft. per minute through the syphon pipe or buckets draining the dryers. Thus the water is sucked off the surface of the dryers and causes a high circulation of steam in the dryers which absolutely eliminates air pockets. The same process of circulating steam at a high velocity passes through section C, section B to section A. The Farnsworth Condensation Pump connected with the ejector at dry end pulls a vacuum on return header of section A, causing high velocity of steam through dryers and also drains all of the steam separators. The Condensation Pump automatically pumps the high temperature condensate to the Farnsworth Boiler Feeding system or to any other point. The ejector tees on the main header between each section helps to cause a high velocity of steam as the regulating valve opens when insufficient steam is supplied from the return header of the previous section. While gauges shown above only indicate one pound drop in pressure between each section any drop in pressure that may be desired may be had by moving the weights on the regulating valves. Regulation of the main control valve at dry end controls temperature throughout machine proportionately. The simplicity of this system insures minimum maintenance charge. Any temperature controlling device can be used.

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the intensities noted on the curve represent the minimum under a given set of conditions. The average intensity over the surface of the machine side will be somewhat higher than those given.

Example. The tending side of a machine, housed in a room with a 20 foot ceiling is to be illuminated to an intensity of not less than 2.0 foot candle. The hanging will be taken as 18 feet; under 18 feet on the scale of "Hanging Heights," the correct spacing will be seen to be approximately 19 feet, and on the scale below that the clearance is read off as roughly 8 feet. Tracing this same line up to the lamp size curves, it will be noted that the 300 watt Mazda C lamp will give a trifle less than 1.5 foot candle, whereas the 500 watt Mazda C lamp will give a little more than 2.5 foot candle. The latter lamp is the one to use.

Another type of unit can also be applied in the same manner. This is the angle reflector unit. The curve giving the necessary installation data is shown in Fig. 14. The general method of using this curve is the same as that for the preceding one. The elliptical angle unit will give a more even distribution over the machine side and should be used wherever it may be practicable to do so. Wherever the angle or elliptical angle reflector units are used for hanging heights below 15 feet, caution should be exercised in order to prevent glare, as the lamps are entirely exposed to view from one side. The easiest method of eliminating glare is to use bowl-enameled lamps in such cases.

Two day views showing the application of elliptical angle units

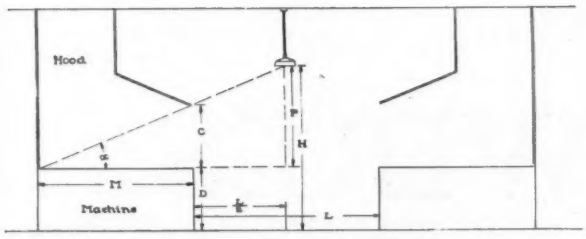

Fig. 17.

Figure used for deriving formula to be used in obtaining installation data for hooded parts of machines.

to machine lighting are shown in Figs. 15 and 16. The first shows a room having an extremely low ceiling (10 feet) and the second shows one with a very high ceiling (24 feet).

Oftentimes machines are equipped with hoods to protect the paper from foreign matter falling from the ceiling. Where these are used a little more care should be taken to see that light is provided beneath them. The following may be of service when considering this problem.

Fig. 17 shows two hooded machines in a room with conditions as follows:

M—Width of machine.
D—Height (at hood) of machine.
C—Height of hood above machine.
L—Distance from first machine to second machine or wall.
H—Hanging height of lighting unit.

$$H = P\ D$$

$$\tan x = \frac{C}{M}$$

$$P = (M \frac{L}{2}) \tan x$$

$$P = (M \frac{L}{2}) \frac{C}{M}$$

$$H = (M \frac{L}{2}) \frac{C}{M} D$$

When $\frac{C}{M}$ is less than 0.37, the RLM Standard Dome unit shown in the figure cannot be used, and the angle reflector unit should be resorted to, but two rows must be employed, the necessary data for this unit. One row of RLM Standard one for each machine. The curve shown in figure 14 will give Dome units will suffice for both machines when they are applicable. For low hanging heights (12 feet) 150 watt bowl

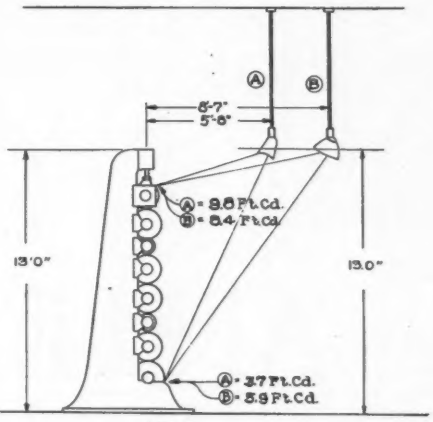

Fig. 18

Localized Calendar Lighting using 200 Watt Mazda "C" Lamps in either Angle or Elliptical Angle Reflectors.

enameled lamps can be used, while for greater hanging heights, the 200 or 300 watt size may be necessary.

The lighting of calendar stacks can be accomplished by using either the RLM Standard Dome elliptical angle, or angle reflector units. The method of procedure is the same as that already described. In Figure 18 is shown the installation data for a typical supercalendar stack, using either the elliptical angle or angle reflector unit. The first unit is more to be preferred because a fairly even intensity is obtainable over the working surface of the calendar.

Finishing Room

While the lighting problems of the finishing room are not complex in nature, an intelligent selection and application of

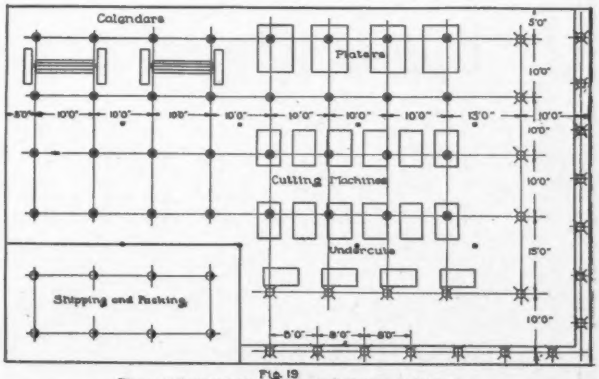

Fig. 19

Plan of Finishing Room Showing Location of Outlets.
150 Watt Bowl Enameled Daylight Mazda "C" Lamp in RLM Standard Dome Reflector.
150 Watt Bowl Enameled Mazda "C" Lamp in RLM Standard Dome Reflector.
100 Watt Bowl Enameled Mazda "C" Lamp in RLM Standard Dome Reflector.

units is essential if the best results are to be obtained. This is particularly true in the case of inspection table lighting where either direct glare from carelessly placed units or glaring reflections from highly calendared stock will eventually result in

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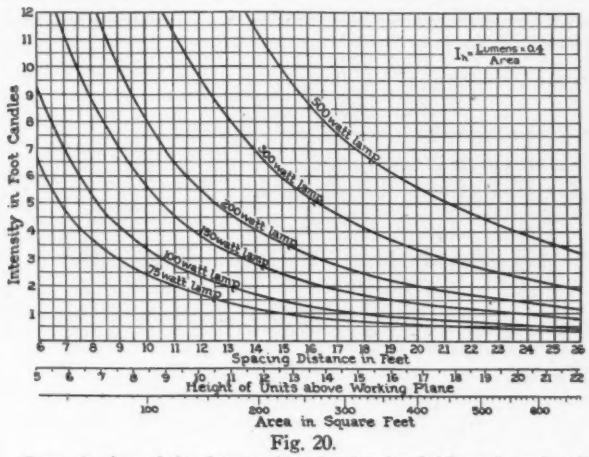

Fig. 20.

Curve showing relation between intensity, hanging height and spacing distance for various sizes of bowl enameled daylight Mazda C lamps in RLM Dome reflectors.

serious impairment of the operator's vision. Clear lamps should never be used in inspection rooms as the resultant glare will hinder the operators in their work. Inspection of paper also brings into the problem the color of light used and many mills are now using the blue bulb daylight Mazda lamp in suitable reflectors to facilitate this examinaiton of paper.

The rest of the operations carried on in this department can be effectively lighted by a system of general illumination employing the bowl enameled Mazda C lamp in RLM Standard Dome reflectors. The curves shown in Fig. 4 will be useful in designing this part of the installation while for the inspection area, the curves on daylight lamps and RLM Dome reflectors shown in Fig. 20 will serve as a guide. A typical layout

Fig. 21.

A night view of a corner of a finishing room, showing the inspection tables lighted to a high intensity by means of 150 watt daylight Mazda C lamps, bowl frosted, in RLM Standard Dome reflectors hung approximately 6 feet above the tables on 8 foot centers. Intensity is roughly 9 foot candle.

of a Finishing Room embodying the method described is given in Fig. 19.

Another way of lighting inspection areas or rooms employs Mazda C lamps in totally enclosing or semi-indirect units, such as those pictured in Figure 3. The light from these units is quite diffuse, which results in soft shadows with no glare, either direct or reflected. The installation is also more pleasing in appearance.

Fig. 22.

Night view of a corner of a finishing room devoted to packing. The units are made up of 150 watt daylight Mazda C lamps, in RLM standard domes, hung approximately 6 feet above the tables, spaced 8 feet apart. Excellent results are obtainable under this installation.

That the old system of local bench lighting in these rooms adhered to even now by a large number of mills has nothing left to recommend its continued use is evidenced by the night picture of an inspection room in Figure 21. Careful examination can be rapidly carried on under such an installation. A corner of a packing room lighted in a similar manner is given in Figure 22.

The following is a list of the most important paper making operations, from the lighting standpoint, and the intensities recommended for each.

Fig. 23.

The component part of an accurate color matching unit for industrial use.

Table II

Name	*Recommended Intensity in Foot Candles*	
Beating and washing	5.0	
Machine Room		
Tending Side	6.0	horizontal
	2–4	vertical
Driving Side	6.0	
	2–4	vertical
Calendars	4–8	vertical
Finishing room		
Super-calendars	4–8	vertical
Inspection at Smoothing Rolls	10–20	
Platers	8.0	
Cutters	8.0	
Inspecting, Sorting, Counting	12–20	
Undercuts	8.0	
Packing	8.0	
Shipping	6.0	
Offices	8–12	

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Are you interested in a process of bleaching pulp which will enable you to obtain better quality pulp at a LOWER COST.

The main features of this new system, now in successful operation, are:

1st. **Greater QUANTITY** of output, because bleaching is done at 18 to 20% density, instead of 5 to 6% which is the usual practice: therefore three times as much bleaching is done in the same space.

2nd. **Improved QUALITY** of product, due to the fact that low temperatures and great concentration of solution make it possible not only to obtain better **color,** but also to bleach out practically all **organic dirt.** This being done with less destruction of cellulose a **stronger fibre** is produced.

3rd. **Greater ECONOMY** in bleaching process has been demonstrated in one three-unit plant as follows:

(a) Lower bleaching temperature, affecting a saving in fuel of approximately.....$1.00 per ton

(b) Less consumption of bleach, affecting a saving of approximately ..... 1.75 per ton

(c) Less shrinkage of pulp during bleaching operation, affecting a saving of approximately..... 1.25 per ton

Total saving .....$4.00 per ton

This means a Net Yearly Saving, for a 100 ton Pulp Mill, of Over $120,000

In addition to the direct economies listed above, there are the following advantages:

1st. Just as clean pulp can be made from drum barked wood as from hand barked wood.

2nd. Exceptionally clean pulp can be produced from very low grade wood.

3rd. Practically no culling of rotten or discolored wood is necessary in order to produce clean pulp.

This means very Substantial Savings in wood and wood preparing costs

THE R. B. WOLF COMPANY

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Color Matching

For mills making colored writing paper or wherever color discrimination is made, a light of true daylight or north sky quality, but decidedly steadier than natural light can be obtained by using an accurate color matching unit. Such a unit, particularly suitable for industrial laboratories is shown in Figure 23.

Maintenance

The most carefully designed system of lighting is seriously handicapped unless a reasonable amount of attention is paid to cleaning of lamps and reflectors, replacng burned out lamps, dscarding lamps that have been burned beyond their rated life, and using lamps of proper voltage.

A system of cleaning and inspection at intervals of one month or so, should be instituted as a means of economical operation for every system, as otherwise current will be consumed without receiving in return the full results from the units.

A great help to any system of lighting that cannot be too highly rated, is the application of suitable paint to side walls and ceilings. A glance at any of the pictures shown in which the installations have been termed good, will reveal the fact that as much attention has been paid to the interior finish of the rooms as to both the machinery and lighting. A good flat white paint applied to walls and ceilings is easily capable of adding fifty per cent to the light on the working areas.

Conclusion

While the paper making field is so extensive in the variety of processes and operations covered that some parts must necessarily be slighted in order to keep within reasonable bounds, still it is hoped that the subjects treated will be of some aid in acquainting members of the trade with the fact that it is an economical possibility to secure the benefits of having well lighted work rooms, not only during operation by night but also on such days or at times of the day when natural light is below the standards prescribed for proper working conditions.

In closing it is our wish to extend a word of appreciation to the numerous mill owners, managers and superintendents whose interest and permission to secure the necessary data and photographs made possible this article.

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Some Factors Influencing the Yield and Strength of Pulp Cooked by the Soda Process

Read at the Annual Meeting of the Technical Association by Martin L. Griffin, North Dighton, Mass.

Some improvements have been made in the soda process from time to time to increase the yield and thereby the strength, the most important of which have been the careful sizing of the chips, shortening of the cooking time and the systematic rotation of the digesters. No improvements have been made in the manner of charging the digester, the circulation or the control of the process.

Conditions Which Tend to Weaken Pulp

There are still some matters in this connection which I suppose are not well known and it is easy to understand why they have not been realized and yet it seems to me have been overlooked too long. I have in mind those influencing the conditions which tend to weaken the strength of the pulp and consequently degrade its value and yield.

When I call to your minds the similarity of the process in cotton textile finishing with that of reducing wood to finished pulp by the soda process, you will realize better the similarity of many of the chemical problems.

Cotton fabrics from the loom are boiled usually in high pressure kiers with alkalies to remove the impurities contained in the cotton and the sizing used in their manufacture. The cloth is washed and then bleached or "chemicked," as it is called in this industry. Wood is reduced to finished pulp in essentially the same way.

Conditions Very Exacting

The conditions imposed upon the process of bleaching and chemicking the cloth are very exacting and failure to recognize them would result disastrously. The cloth must not be tendered or oxidized. If it is tendered, its value is destroyed, if it is oxidized, it will not dye level and this is fatal. These defects require no deep investigation to prove their existence. They come out in the processes. Not so in the case of pulp unless the defects are glaring. It is not easy to discover small differences in the strength and yield of pulp.

So far as I know, no one has brought forth any forecast as to whether the part of the chips and pulp in a digester at all times submerged in the liquor and that part which may be exposed to an atmosphere of steam at the top are any different at the end of the operation. It would be difficult to discover.

Must Be Submerged at All Times

In bleaching cloth in kiers, we have ready means and absolute proof to show that cloth must be submerged or wet in the liquor at all times to avoid tendering, any part of which, if exposed to an atmosphere of dry steam, is pretty sure to be tendered. This is common knowledge with all the cotton finishers. This same truth is well known to those acquainted with the sulphite process, where failure to submerge the chips in the liquor is bad practice and where slight differences in the residual sulphurous acid at the end of the cook effects the strength, yield and bleaching qualities to a marked degree.

Efforts to Increase Yield

It has long been assumed that soda pulp is necessarily short and without much strength and the effort to improve and get the yield out of the process has been limited for the most part to shortening the time of cooking. It is well known that the sulphite and sulphate processes will give a much larger yield of well cooked, easy bleaching pulp than the soda process, from the same woods. What is the explanation?

To my mind, the reason lies in the fact that the sulphite process and the sulphate process are deoxidizing and therefore act to preserve the strength and increase the yield. The question naturally arises why the old type of soda process should persist or why if so, means should not be resorted to to correct these defects. Means have been brought forward in some measure which will overcome them but little heed has been given them.

Some years ago, Joseph E. Hedin, a member of our association, and then manager of the Delaware Mills of the Jessup & Moore Paper Company, discovered that the yield of soda pulp was in-

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creased by three to five per cent by the addition of small quantities of sulphur to the cooking liquor and a patent was granted to him therefore.

I myself conducted a series of experiments later using increasingly small quantities of sulphur, proving conclusively that the yield was increased accordingly as the amount of sulphur was increased. This is due, of course, to the fact that sulphur is a strong deoxidizing agent.

In 1920, my colleague, Mr. Spence, presented a paper on the "Use of Sulphur in Cooking Soda Pulp," having reference to its influence on the amount of bleach required but with no reference to its effects on yield.

Knowing as I do the evil and dangerous effects of boiling cotton fabrics in high pressure kiers if at all exposed to an atmosphere of steam, I feel very sure that the common practice of cooking wood by the soda process in which a considerable proportion of the chips and pulp are more or less exposed to an atmosphere of high pressure steam is detrimental to the quality and yield of the pulp. For many years, I have had strong convictions regarding the importance of a free circulation of the cooking liquor and the advantages of relatively low temperatures. These convictions have been amply sustained by my late experiences.

To those who have been engaged only with cooking wood, which is the most resistant of all raw materials for paper, these baneful effects will not be so apparent, but to those who are experienced in reducing jute, hemp and esparto, the necessity for a very discriminating treatment will be evident.

In cotton finishing the injector circulating system was a common practice but today this type has been very largely replaced by a positive pump circulation in which the liquor and the cloth fill the entire space and the kier may be circulated in either direction. As I have said before, the evil or beneficial effects in treating cloth are very apparent and I am satisfied are a sure indication of the mode of treatment which should be employed in cooking wood pulp.

A system which will prevent oxidation either by the use of a deoxidizing solution or by a circulating system which will cover or submerge and penetrate all parts of the mass alike and avoid as far as possible high temperatures will surely enlarge the yield and improve the quality of the product.

To my mind there is no system so effective as a positive pump, so arranged that the liquor may be circulated in either direction. The upward circulation is very buoyant and free whereas the downward direction tends to pack. Both directions, downward by the soda process and upward by the sulphite, are common in cooking pulp but they "lack the pep" of the positive pump. The obstacles to using a pump for positive upward circulation are slight compared to the great advantages and as applied to the sulphite process of cooking would show astonishing results.

I have fully realized in the past how difficult it is for the mill chemist to initiate reforms in his own domain but I hope that there are chemists here today with knowledge, experience and personally capable of putting through some of these fundamental principles which I have tried to present convincingly.

Report of the Committee on Bibliography

Report to the Annual Meeting of the Technical Association by Clarence Jay West, Chairman of Committee on Bibliography.

The Committee on Bibliography wishes to report progress in its work, though it feels that much more could have been accomplished had circumstances permitted. There is also a feeling that the work of the committee would be more beneficial to the industry were the individual members of the association to constructively criticize it. The chairman would welcome this form of cooperation from any or all of the technical group.

The Committee again wishes to call attention to the desirability of forwarding to the chairman copies of all printed matter relating to the paper industry. Only in this way can we hope to keep in touch with developments and pass this information on to those who can use it in their work.

During the past year contracts have been made with the larger number of the paper magazines through which the committee receives copies of the publications devoted to paper. This will enable the preparation of a much more complete bibliography of paper making, a feature which it is hoped will be an annual compilation by the committee.

The committee wishes to take this opportunity of expressing their appreciation of the co-operation of these journals.

Inasmuch as these are really donated to the industry and not to the chairman personally, we wish to announce that beginning with January 1, 1922, copies of any of the following may be **borrowed by any member of the Technical Association** upon promise of return and payment of postage. Inquiries should be addressed to 1701 Massachusetts avenue, Washington, D. C.

PAPER TRADE JOURNAL. *Paper, Paper Industry, Pulp and Paper Magazine of Canada, Paper Mill, The Paper Makers Monthly Journal, Papier, La Papeterie, Moniteur de la papeterie francaise, Svensk Pappers-Tidning, Papir-Journalen, Swedish Export, Papier-Zeitung, Papier-Fabrikant (Cellulosechemie), Wochenblatt für Papierfabrikation, Zellstoff und Papier, Pappen und Holzstoff Zeitung, Papier und Schreibwaren Zeitung, Boxboard, Carton Age, Fibre Containers, World's Paper Trade Review.*

The publications of the committee for the past year (1921-1922) are as follows:

No. 25. Paper manufacture. A bibliography compiled by H. H. B. Meyer. PAPER TRADE J. 72, no. 13, 56-66; no. 14, 50-58; no. 15, 48-60 (Mar. 24-31, Apr. 7, 1921).

No. 26. Recent literature on the determination of cellulose. Compiled by Hottenroth; translated by Clarence J. West. PAPER TRADE J. 72, no. 17, 50-54 (Apr. 21, 1921).

No. 27. A bibliography of marbled paper. Dard Hunter. PAPER TRADE J. 72, no. 18, 52 ff. (Apr. 28, 1921).

No. 28. Reciprocity and the tariff in the paper industry. Clarence J. West. PAPER TRADE J. 72, no. 19, 48 ff. (May 5, 1921).

No. 29. The dyeing of pulp and paper. Clarence J. West. PAPER TRADE J. 72, no. 20, 46 ff. (May 12, 1921).

No. 30. Reading list on paper yarns and textiles. Clarence J. West. PAPER TRADE J. 72, no. 22, 42 ff. (May 26, 1921).

No. 31. Clay in the paper industry. A reading list compiled by Clarence J. West. PAPER TRADE J. 72, no, 23, 52 ff. (June 2, 1921).

No. 32. Special Papers. III. Cigarette paper, a reading list. Clarence J. West. PAPER TRADE J., no. 25, 44 ff. (June 16, 1921).

No. 33. Paper Research Literature. VIII. The work of C. F. Cross. Arranged by Clarence J. West. *World's Paper Trade Rev.* 75, no. 4, 338 (Jan. 28, 1921); PAPER TRADE J. 73, no. 3, 46 ff. (July 21, 1921).

No. 34. Sulphate pulp and kraft paper. List of references covering the literature up to 1912. Clinton K. Textor. PAPER TRADE J. 73, no. 4, 46 ff.; no. 6, 46 ff.; no. 7, 54 ff. (July 28, Aug. 11-18, 1921).

No. 35. Recent literature on soda and sulphate pulps. Clarence J. West. PAPER TRADE J. 73, no. 16, 46 ff.; no. 17, 42 ff. (Oct. 20-27, 1921).

Earlier contributions of the committee are listed in the report for 1921, copy of which will be sent upon request.

Where the Wheels of Paper Progress Turn

The First Carload of Kraft Paper ever brought into the United States was imported *BY US* in 1905.

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THE HUBBS LINES

The Efficient Production of Mechanical Pulp

Read at the Annual Meeting of the Technical Association by Adolph F. Meyer, Mem. Am. Soc. C. E., Mem. Am. Soc. M. E., Consulting Engineer, Minneapolis, Minn.

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Mechanical pulp, or groundwood, must first of all be of the quality necessary to produce the desired grade of paper or paperboard and to run satisfactorily on the paper machine. Quality is of prime importance. My observations in pulp mills, from Maine and Quebec in the East, to Oregon, Washington and British Columbia in the West, indicate that there are widely different methods in use of producing a good grade of mechanical pulp for use in news print paper. The power consumed per ton of news pulp produced also differs greatly in the different mills.

The efficiency with which groundwood is produced depends upon several factors. The groundwood man can vary the average grinding pressure, the temperature of the stock in the pit and the character of the grindstone surface at will. Over these three factors he has full and complete control. In the case of other factors, however, of really greater effect on the horsepower consumption per ton of pulp produced, he is entirely dependent for efficiency on the machinery used.

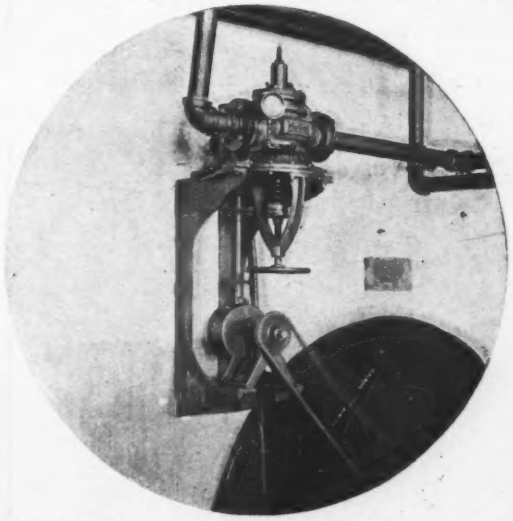
There is much need for the replacement of old, inefficient water-wheels with runners of modern design. A year ago, Professor Allen* pointed out before this association, in a most emphatic manner, how the efficiency of water-power plants can be increased. My

THE MEYER GOVERNOR.

comments today will be directed to the means for operating any given water-wheel installation most efficiently from the viewpoint of speed control.

Every water-wheel, whether efficient or inefficient, whether properly or improperly installed, must run at a certain speed for a given head and gate opening if it is to deliver to the pulp grinder the maximum amount of power which it is capable of developing from the water used.

Speed selection and speed regulation have a far greater bearing on the efficient production of groundwood than most men realize, because there has been no opportunity for comparison. Holyoke test data for eight typical, high-efficiency, modern water-wheels indicate that these wheels, when running 15 per cent overspeed, pro-



FIRST INSTALLATION OF MEYER GOVERNORS—WALL TYPE MACHINE.

duce, on an average, 13 per cent less power from the water used than if they ran at their most efficient speed. The relation between speed and efficiency, or pulp produced at given head, gate opening and water consumption, is shown in Fig. 1.

Not only is it necessary to select the most efficient speed at which to run a water-wheel for every head and gate opening, but it is necessary to maintain this speed if the available water is to produce the maximum amount of power.

The successful control of the speed of water-wheels necessitates the installation of governors. Water-wheels driving electric generators are satisfactorily controlled by oil pressure governors, which vary the gate opening with variations in load. Since these changes in gate opening cannot be made in too small a fraction of a second, on account of the momentum of the water in the draft tube and the penstock, flywheels are commonly installed for the purpose of reducing the rate at which speed changes will occur in the hydro-electric unit for given changes in load. Large speed changes in hydro-electric generators, due to large changes in load, usually consume several seconds for readjustment. Extremely rapid action not only is impossible in view of all the mechanism involved, but if it were possible, it would be disastrous in view of the momentum of the water whose velocity must be changed. Compensating devices used in governors of this type virtually amount to mechanisms which move the gates a certain distance and then wait for the effect of this movement to manifest itself in a speed change. The greater the momentum of the water, as in the case of a long penstock, for example, the more slowly the governor must change the gate opening. For this reason, deflecting nozzles are commonly used on high-

*Technical Association Papers, Series II, p. 1.

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head, hydro-electric installations and changes in gate opening are made very gradually. In other high-head installations, a bypass, operated by the gate mechanism, is utilized. Such a bypass opens at a rate which compensates the closing of the turbine gates, and then the bypass itself closes at a very slow rate, which will not set up water-hammer effects in the penstock.

Water-wheels driving pulp grinders cannot be controlled in either of these ways. Several expensive experiments, resulting in extensive damage to the installation, have been made in various parts of the country, in order to establish this fact. The ordinary grindstone has practically no flywheel effect, consequently changes in water-wheel speed occur with incredible rapidity when the load is

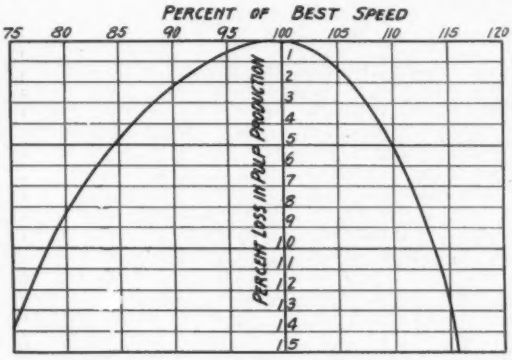
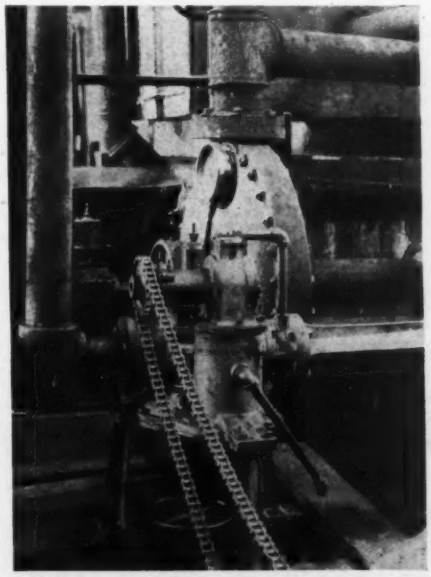


FIG. 1.

Loss of pulp produced by grinder through inefficient turbine speeds.

changed. Small fractions of a second, merely, are consumed by some installations, for speed changes of 15 or 20 revolutions per minute. It is needless to say that any governor which endeavors to control the speed of a water-wheel driving a pulp grinder must act in a very small fraction of a second. For this reason alone,



TYPICAL INSTALLATION—GOVERNOR PLACED ON FLOOR.

controlling the speed of the turbine by changing the gate opening is impracticable. Moreover, such regulation would involve loss of production through reduction in gate opening and would result in a loss of efficiency because of the speed changes required for most efficient operation at the various gate openings.

The only practicable method for controlling the speed of a water-wheel driving a pulp grinder is through the grinder itself; that is, through automatically maintaining a uniform friction load on the water-wheel by changing the pressure on the wood in the grinder pockets.

Water-wheels driving ungoverned pulp grinders tend to run either too fast or too slow, because at the most efficient speed the water-

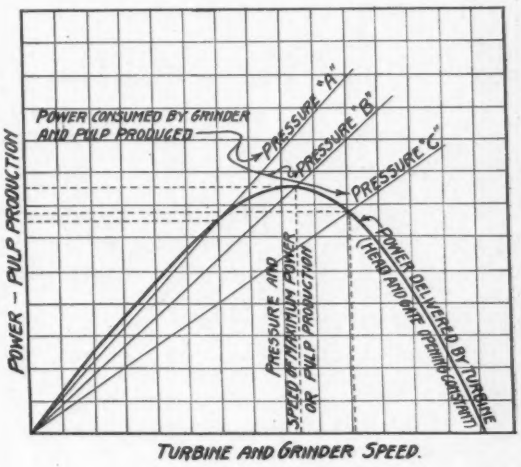

POWER CONSUMED BY GRINDER AND PULP PRODUCED
PRESSURE "A"
PRESSURE "B"
PRESSURE "C"
POWER DELIVERED BY TURBINE (HEAD AND GATE OPENING CONSTANT)
SPEED OF MAXIMUM POWER OR PULP PRODUCTION
POWER - PULP PRODUCTION
TURBINE AND GRINDER SPEED.

FIG. 2.

Relation between power delivered by turbine and pulp produced by grinder at various speeds and grinding pressures.

wheel delivers the maximum power to the grinder. This is well illustrated by Fig. 2. Under the pressure "A" the curve of power delivered by the turbine runs almost parallel to the line representing power consumed by the grinder. A very small increase in pressure

TYPICAL INSTALLATION—GOVERNOR PLACED ON PLATFORM.

results in a large reduction in speed, and a small reduction in pressure results in a large increase in speed. If this grinder is now run at pressure "C," there will be relatively small changes in speed for considerable changes in pressure, but the efficiency will be greatly reduced because the water-wheel will be continually running overspeed. In other words, ungoverned grinders running a little over

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speed show less speed variation than those running a little under speed, even though the loss in efficiency may be just as great or greater.

Fig. 3 gives typical turbine curves showing how the most efficient turbine speed varies with changes in head. If the best speed is 200 r. p. m. under a 32-foot head, for example, then under a 40-foot head the speed should be increased to 225 r. p. m.

Fig. 4 gives typical turbine curves showing how the most efficient speed varies with gate opening.

The need for running water-wheels at their most efficient speed in order to produce groundwood economically, must be apparent from the facts given.

Two years ago, in a paper before this association, I told of a new invention for controlling the speed of water-wheel driven pulp grinders. At that time the invention had been in use only a few months. Several orders for trial machines were received during the following summer. The success of this machine was so striking—new installations paid for themselves in such a few weeks—that during the next year and three-quarters over 160 Meyer governors have been furnished to pulp mills all over the country.

The reason for the success of this governor may be briefly summarized as follows:

1. *It forces the water-wheel to run at its most efficient speed.* Thereby it prevents grindstone breakage and makes possible the production of about 10 per cent more pulp at no cost but that of the wood ground, and at the same time improves the quality.

2. *It gives to the man in charge of the grinder-room a larger measure of control over the quality of pulp produced.*

Besides improving the uniformity of pulp by maintaining constant speed, the governor permits the operator to secure more readily any desired quality of pulp, within the limits of economical operation of the water-wheel, by permitting the use of any desired grinding pressure and temperature. For example, the governor can be

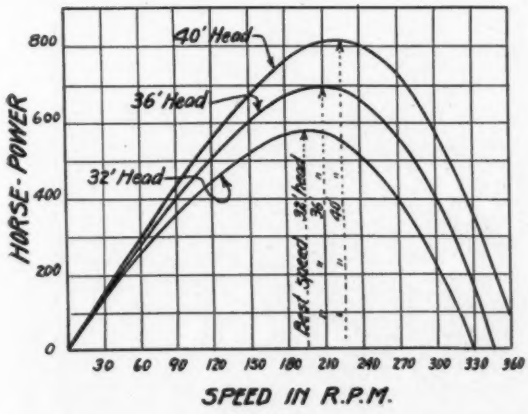

Fig. 3.

Typical turbine curves showing best speed for various heads—gate opening constant

set to run the turbine at 5 per cent over speed, or 5 per cent under speed, with an average loss of about 1 per cent in efficiency, but with a change of 10 per cent in the grinding pressure. Whenever water must be wasted over the dam, even larger speed changes may be made to secure desired changes in grinding pressure. By changing the turbine gate opening or the number of pockets in use, the average grinding pressure may also be changed.

In the winter-time slow pulp may be "freed up" by grinding at higher pressures and temperatures. Higher temperatures may be secured directly if the stock in the grinder pit can be further thickened by reducing the shower water. Higher temperatures may be secured indirectly through higher pressures and duller stones, either by setting the governor for slower speed or grinding with fewer pockets, or both, if necessary. Although sharpening the grindstone produces a freer-fibered pulp, it also reduces the temperature of the stock. This reduction in temperature increases the surface tension and the viscosity of the water, which results in a *slower* pulp on the paper machines, leading usually to the use of the steam hose. Sharpening of grindstones, therefore, with any given burr, produces a result which combines the effect of two directly opposite tendencies, either of which may overshadow the other and control the effect produced.

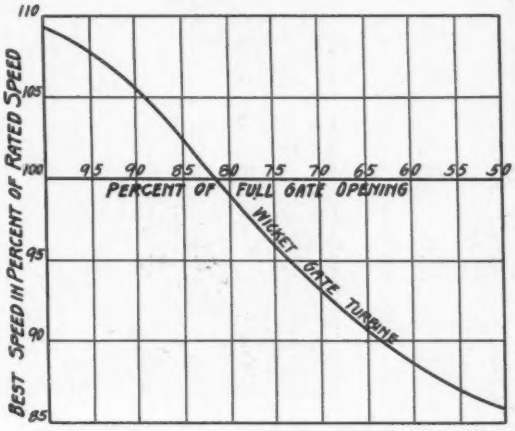

Fig. 4.

Typical curve showing most efficient turbine speed, in per cent of rated speed, for various gate openings. (Rated speed is best speed at gate opening giving highest efficiency.)

In the summer-time, free pulp may be slowed up directly by grinding at lower pressures. It may be slowed up indirectly by lowering the grinding temperature, either by thinning out the stock in the grinder pit or by sharpening the grindstones more frequently with finer burrs lightly applied. Lower grinding pressures are secured with the governor by setting for higher speeds, using more pockets or reducing the power delivered to the grindstone by changing the turbine gate opening.

The type of burr used may also be changed. Other conditions remaining constant, the burr with the screw thread corrugations produces slower pulp and less slivers, although less uniformity of fiber than the burr with equal sized corrugations running straight across. Various types of spirals produce intermediate effects. The coarser the corrugations, of course, the freer the pulp, other conditions remaining equal. The burrs most commonly used are the numbers 8, 9 and 10. Diamond point burrs of equal number, similarly applied, produce freer pulp than either of the other kinds. Fine diamond burrs frequently and lightly applied, and when relatively high grinding pressures are used, produce a good grade of moderately free, long-fibered pulp.

Although the grindstone dressing influences the quality of pulp produced more than any other factor, yet the governor gives the operator a measure of control over all other factors involved that cannot be secured in any other way.

How the Governor Makes Possible the More Efficient Production of Mechanical Pulp

1. *By maintaining the most efficient turbine speed, this governor enables the grinder to produce, on an average,* 10 *per cent more and better pulp at no cost but that of the wood ground.*

The increase in pulp output is secured with the same amount of water, the same labor, the same grinders, the same overhead charges. The cost of the additional pulp produced is only the bare cost of the wood used. For example, when rossed wood is worth $20 per ton of pulp produced and the pulp is worth $40 per ton at the mill, the gain is $20 a ton. Assume two grindstones on a line,

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having a normal production of 14 tons of pulp a day. When the governor increases the output by 10 per cent, or 1.4 tons, at $20 a ton, it earns $28 a day, or over $8,000 a year. This represents about 600 per cent in annual dividends on the average *total cost* of installing the governor.

2. *By maintaining uniform speed, the governor practically eliminates grindstone breakage.*

Pulp mills operating gindstones at relatively high speeds have found that the governor practically eliminates grindstone breakage. This means a saving on cost of grindstones and on repair labor; a reduction in the number of accidents to men feeding the grinders; a reduction in breakage of grinder casings and other appurtenances; and prevents loss of production through idle grinders.

3. *The governor improves the quality of pulp produced and increases the yield per cord.*

When the hydraulic turbine runs at uniform speed, it delivers a constant amount of power to the grinder shaft, and a constant friction load of wood against the grindstones is required to absorb that power. By maintaining uniform speed, this governor maintains a uniform grinding load. This means uniform average pressure of wood against grindstones when all pockets are on.

Repeated tests have clearly demonstrated that the pressure shown by a gage on the water supply system to the pockets does not record the grinding pressure. If it did, the speed variations observed on ungoverned grinders using the constant pressure system, with all pockets on, could not exist. A large percentage of the normal supply pressure is lost in friction of pistons and glands, and particularly in the arching and binding of the wood in the pockets, and in overcoming the resistance of hard knots in the wood.

Fig. 5 is a photograph of a typical surface of wood taken from a pulp grinder. The widely different pressures required to produce

FIG. 5.

Photograph of wood block taken from grinder.

a uniform quality of groundwood from different portions of this one block is apparent. A few hard knots against the grindstones will absorb most of the pocket pressure, which, if not increased, will result in the production of a large percentage of wood flour.

Although governing by varying the nominal or gage pressure on the pockets, the governor actually maintains a more uniform *grinding* pressure than the system that maintains a *uniform gage* pressure by means of a pressure regulating valve. When the wood binds in the pockets, or there are hard knots against the grindstone, the governor increases the pressure and reduces the production of wood flour, thus increasing the yield. By maintaining uniform speed, thus eliminating the tearing or chopping action of accelerating speeds, by maintaining a more uniform *grinding* pressure, and a more uniform temperature and consistency of the stock in the pit under the grinders, the governor improves the quality of the pulp produced. Some of our customers who have increased their output over ten per cent with governors have, in addition, so improved the quality of pulp produced that the paper machines run very noticeably better.

The Centrifugal Pump Alone Is Not a Satisfactory Pulp-Grinder Governor

Were it not for certain difficulties, inherent in the operation of water-wheel driven pulp grinders, the centrifugal pump driven from the grinder or water-wheel shaft, and furnishing the pressure with which the wood is forced against the grindstone, would adequately control the speed of such pulp grinders.

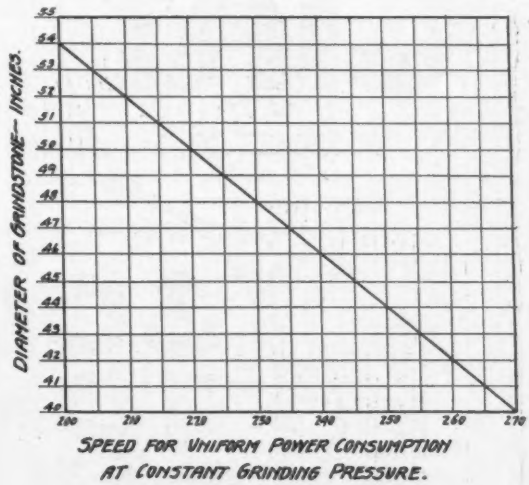

FIG. 6.

Speed required for various grindstone diameters to absorb equal power at constant pressure.

An analysis of the principles underlying the action of a centrifugal pump installed in this manner will be of interest, notwithstanding the failure of the pump as an effective governor.

A water-wheel operating at maximum efficiency runs at a speed which varies as the square root of the head. A centrifugal pump produces a pressure which varies as the square of the speed. Hence a centrifugal pump, driven by a water-wheel, running at its most efficient speed for each head, delivers a pressure which varies directly as the head acting on the turbine.

The friction load produced by the pulp grinder varies directly as the product of the speed and pressure, except for a coefficient of grinding friction which varies slightly with the pressure and the speed. From the statement in the previous paragraph, therefore, with the exception just noted, it follows that the friction load produced by the centrifugal pump, driven by a water-wheel running at its most efficient speed, furnishing pressure to the grinders, varies as the square root of the head times the head, or as the three halves power of the head. Now the power delivered by a turbine varies as the product of the head and the discharge; and since the discharge of water through the turbine, for any given gate opening, varies as the square root of the head, it follows that the power delivered by the turbine, when running at its most efficient speed, is proportional to the three halves power of the head. Thus it is

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seen that both the power delivered by the turbine and the power consumed by the grinder furnished with pressure from a centrifugal pump driven from the turbine shaft are proportional to the three halves power of the head. From this analysis it appears that the centrifugal pump driven from the turbine shaft will theoretically maintain a pressure in the grinder cylinders just sufficient to keep the turbine running at its most efficient speed for all changes in the head of water acting on the turbine.

This theoretical relationship accounts for such success as has attended the use of this type of pulp-grinder governor.

Reasons for Variations in Speed of Grinders Controlled by the Centrifugal Pump

That the centrifugal pump has failed as an effective pulp-grinder governor is evidenced by the speed charts shown elsewhere in this paper.

This failure may be ascribed, first, to the fact that changes in turbine gate opening change the amount of power delivered by the turbine and necessitate definite changes in turbine speed; and second, to the fact that the effective grinding load is continually changing, even though the water pressure in the grinders cylinders remains constant.

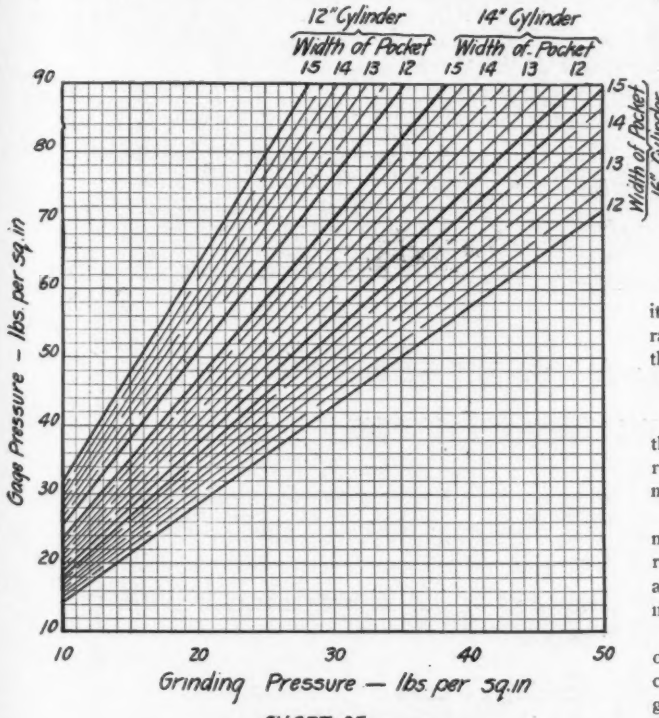


FIG. 7.

Relation between grinding pressure, width of pocket and cylinder diameter.

The Effect of Gate Opening on the Power Delivered to the Grindstones by the Waterwheel

The action of the centrifugal pump as a pulp-grinder governor completely fails when variable gate openings are used. Changes in gate openings are frequently necessitated by changes in water available, and with each change in gate opening the power supplied to the grindstone varies. For any given head the speed of the turbine should be increased as the gate opening is increased. As a rule, the most efficient speed of the turbine increases with the gate opening almost as fast as the power delivered increases; hence, to keep the grinding load proportional to the power delivered, the grinding pressure should remain practically constant. But the centrifugal pump increases the pressure in proportion to the *square* of the actual speed—thus increasing the grinding load and preventing the water-wheel from reaching the most efficient speed for the new gate opening. Likewise, when the gate opening is reduced below its normal amount the centrifugal pump releases the pressure too rapidly, thus allowing the turbine to run at a speed too high for the greatest efficiency.

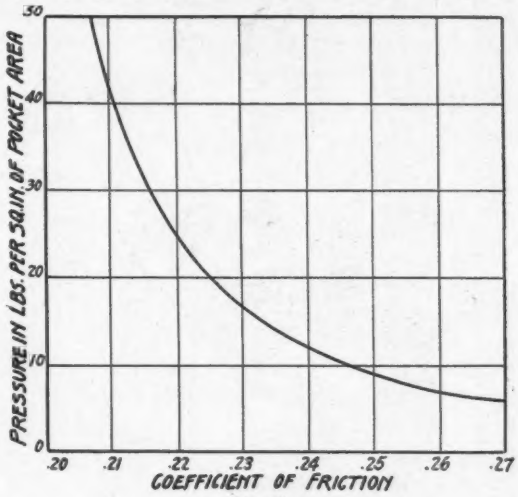


FIG. 8.

Relation of grinding pressure to coefficient of grinding friction. Spruce wood, moderately sharp stone, speed 200 to 250 r. p. m.

Variation in Effective Grinding Load

There are a number of factors in the operation of pulp grinders that cause speed variations to which the centrifugal pump does not respond with pressure sufficient for accurate speed control. The most important of these factors are enumerated below:

1. The grindstones are continually wearing down and therefore must run faster and faster to absorb the same power if the pressure remains constant. A 54-inch stone running at 200 r. p. m. will absorb as much power at a given pressure as a 44-inch stone running at 245 r. p. m. This fact is graphically shown in Fig. 6.

2. The number of pockets in use varies frequently because empty ones must be pulled off for refilling. The friction load for a fixed cylinder pressure is directly proportional to the number of pockets grinding.

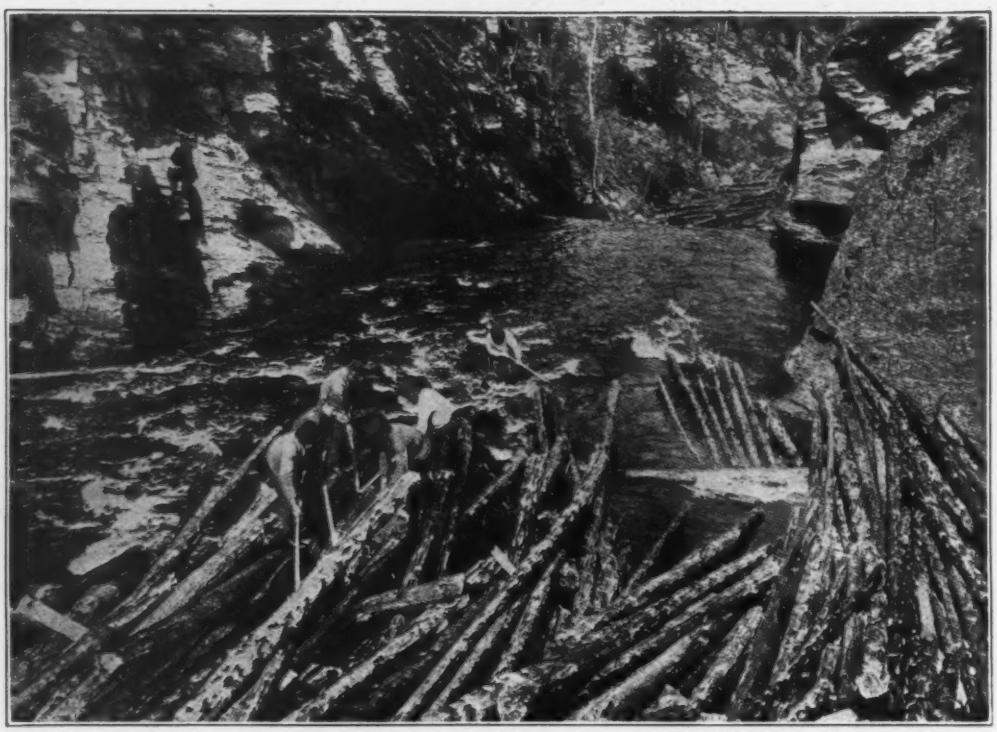
3. Neither round, split nor sawed wood can be so carefully laid into the pockets as to ovecome all arching and binding, and when a block of wood is almost ground away, the slivers remaining have a tendency to wedge under the walls of the pockets, thus producing a variable friction load.

4. Many blocks of wood have hard knots scattered through them that produce very little grinding load unless the cylinder pressure is materially increased. This fact is illustrated in Fig. 5.

5. A large block of wood free from knots produces a heavy grinding load. Small sticks produce lighter loads. In general, the grinding load varies continually with the character of the wood and the area in contact.

6. Repacking of pistons and tightening up of the glands increases the pressure required to move the plungers and therefore reduces the pressure which is effective in forcing the wood against the grindstone.

7. The coefficient of grinding friction varies with the pressure



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with which the wood is pressed against the grindstone. Because of this variation in the coefficient of grinding friction, the friction load produced by each pocket varies continually as the area of wood in contact with the grindstone varies, notwithstanding the maintenance of a constant gage pressure in the cylinder and independent of any binding in the pockets.

Governor Control Basically Sound

It has just been pointed out why the centrifugal pump, driven from the turbine shaft and supplying pressure directly to the grinder cylinders, fails to maintain uniform speed of grindstones. The governor, though itself actuated by the speed of the turbine and the grinder, does not directly supply pressure to the grinder cylinders. Its action is based on the more positive method of changing the pressure in the grinder cylinders by means of a balanced valve in the supply line, actuated by speed changes. This gives to the governor a responsiveness and a capacity for effecting large and rapid changes in volume and pressure of the water supply to the cylinders, that enables it to control the grinder within a small range of speed.

Getting Maximum Pulp Output per Grindstone

One way of obtaining efficiency in the production of groundwood is to secure the maximum possible pulp output per grinder.

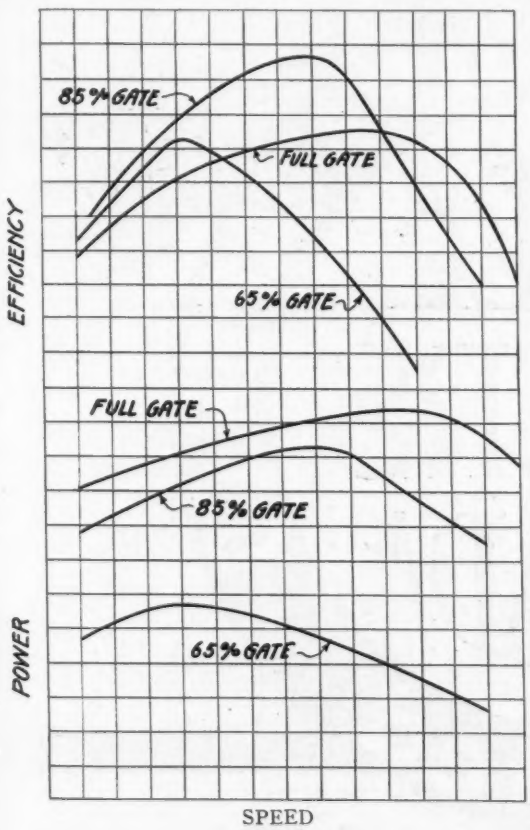


FIG. 9.
Curves showing speed of maximum power and maximum efficiency at various gate openings.

In endeavoring to do this the following considerations should be kept in mind:

1. Pulp output is directly proportional to peripheral speed of grindstone and therefore to r. p. m.
2. Pulp output is directly proportional to number of pockets per grindstone.
3. Pulp output is directly proportional to width of pockets.
4. Pulp output is directly proportional to grinding pressure for small pressure differences, but increases slightly faster than grinding pressure.
5. Pulp output increases with sharpness of the grindstone.

The first three considerations, between quite wide limits, have no effect on the quality of pulp produced. Variations in pressure are

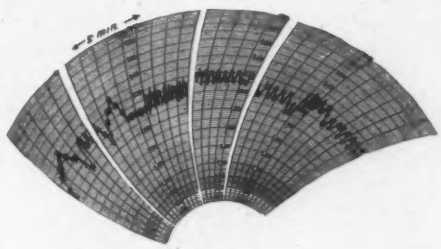


FIG. 10.
Chart showing grinder speeds during power test with Meyer governor.

to an appreciable extent reflected in the quality, but the character of the grindstone surface used is the one factor which overshadows all others in its effect upon the character of the pulp produced. The least power is consumed, per ton of usable pulp produced, by grinding with the sharpest stone and the highest pressure consistent with the desired quality. When using a hard, medium grit stone, frequent light dressings with a comparatively fine burr will permit the use of relatively high grinding pressures and result in maximum economy of power.

Grinding Pressure Defined

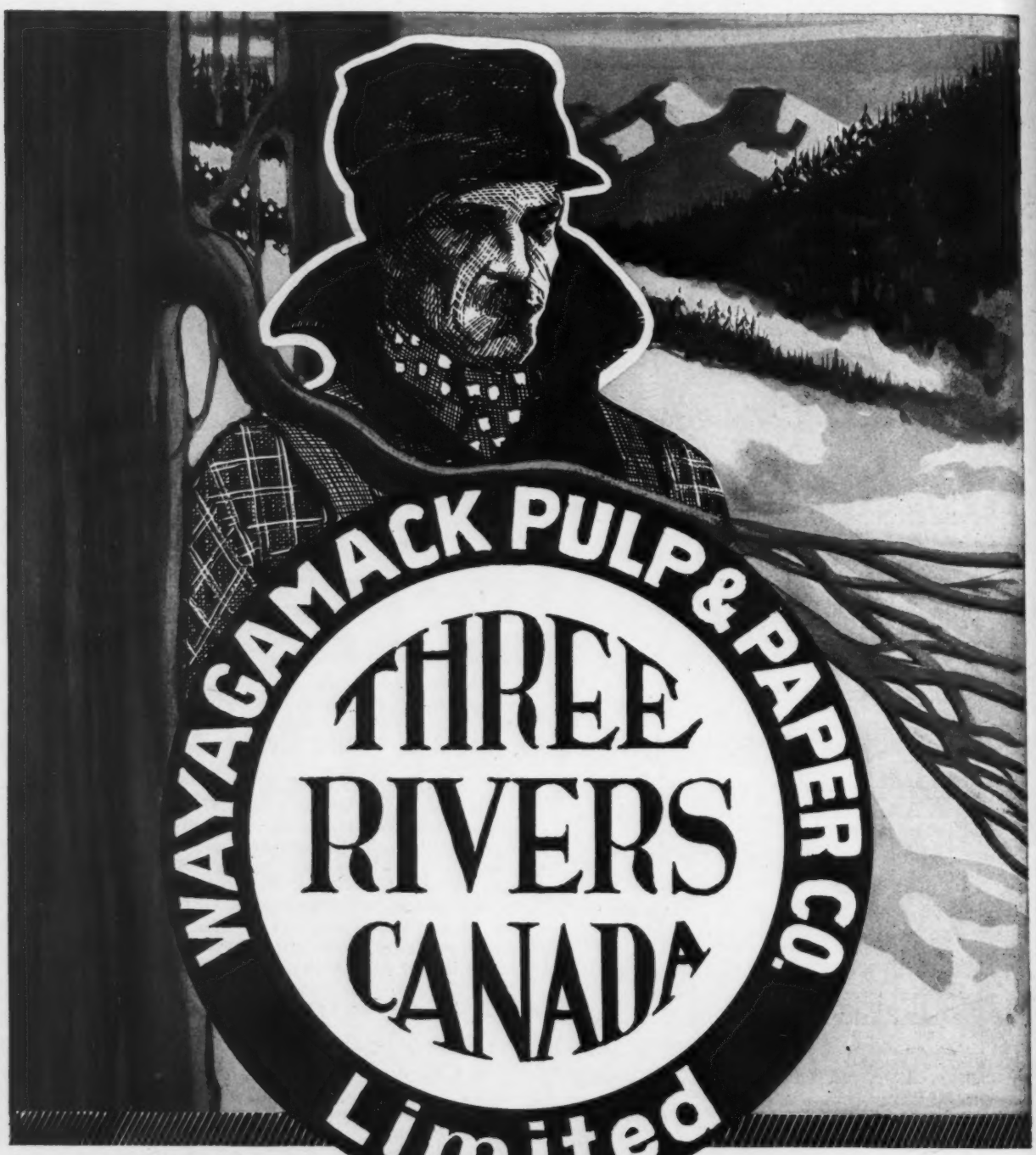
Grinding pressure is frequently confused with water pressure in the grinder cylinders. It more properly refers to the unit pressure between the wood and the stone over the actual area of contact. Since this area is continually changing, the nearest expression to this grinding pressure that it is practicable to use is the pressure per square inch of pocket area.

This pressure per square inch of pocket area is a very different quantity from the water pressure in the grinder cylinders. This fact is most clearly shown by an illustration: Two grinders are using 2 foot wood. One has 12½ inch pockets and 16 inch cylinders; the other has 14½ inch pockets and 12 inch cylinders. For a grinding pressure of 30 pounds per square inch of pocket area, the former grinder requires a water pressure in the cylinders of 45 pounds per square inch, whereas the latter requires 92 pounds per square inch, or more than twice as much.

The diagram of Fig. 7 shows the relation between grinding pressure, width of pockets and cylinder diameter.

Coefficient of Grinding Friction

Fig. 8 shows the coefficient of grinding friction which I have developed from the experiments of the U. S. Department of Agriculture as reported in Bulletin No. 343. At very low grinding pressures, say less than 10 pounds per square inch of pocket area, the coefficient of grinding friction for dull stones approaches the coefficient of sliding friction and results in large percentages of power being lost in pure friction; that is, in the production of heat. At about 5 pounds practically all of the power applied to the grindstones is lost in heat and little but wood flour is produced. The portion of power which is lost in pure sliding friction and merely develops heat diminishes rapidly with increases in grinding pressure up to about 30 pounds, where this change is no longer rapid even with relatively dull stones. At about 50 pounds the power lost in heat is reduced to a minimum but the pulp produced is too coarse for use in paper. Operating conditions which produce a desirable



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quality of pulp lie between the pressures of about 20 and 40 pounds per square inch of pocket area—maximum economy being reached when a minimum amount of power is lost in heat. In general, the

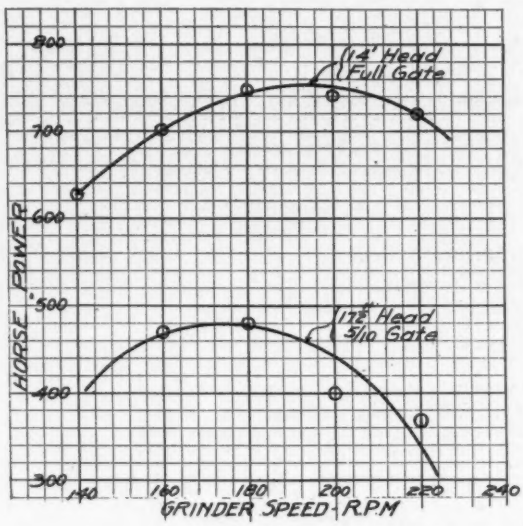

FIG. 11.
Relation between speed and horse power determined with Meyer governor

figures stated are based on moderately sharp stones. I have observed pressures as low as 19 and as high as 37 pounds per square inch of pocket area used in the production of pulp.

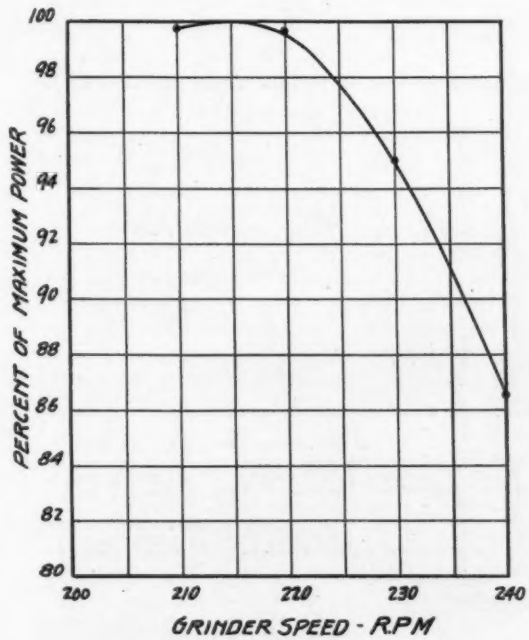

FIG. 12.
Relation between speed and power in per cent of maximum power determined with Meyer governor.

Horse Power per Grinder

In designing new pulp mills, attention should be directed to securing the highest efficiency. This means that the maximum possible amount of power should be used on each grinder, in order to secure maximum pulp output. Power consumption per grinder is increased directly as the speed and the width of pockets, and almost as fast as the grinding pressure for any given quality of pulp.

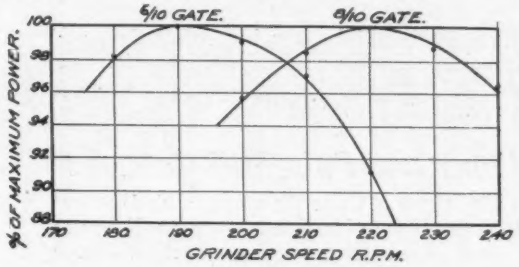

FIG. 13.
Relation between speed and power in per cent of maximum power determined with Meyer governor.

The highest speeds consistent with safe operation of grinders and high efficiency of turbine runners under the given head should be selected. In order to secure high speed, four and even six turbine runners of small diameter are commonly placed on a single grinder line. Governed grinders, 54 inches in diameter, can safely be operated at normal speeds of 250 and even 260 r. p. m.

Pockets can be made 16 inches in width. Wide pockets, however, tend toward considerable arching and binding of the wood. There would be some advantage in using four 12-inch pockets on some grinders in a given mill for small wood and three 16-inch pockets on others for the large blocks.

As an illustration of the factors mentioned consider two pulp mills: One mill operates 3-pocket grinders having a pocket width of 12½ inches, using a pressure of 20 pounds per square inch of pocket area and a speed of 175 r. p. m. Another mill operates 3-pocket grinders having a pocket width of 16 inches, using a pressure of 35 pounds per square inch of pocket area and a speed of 240 r. p. m. The output of the grinders in the second mill is three

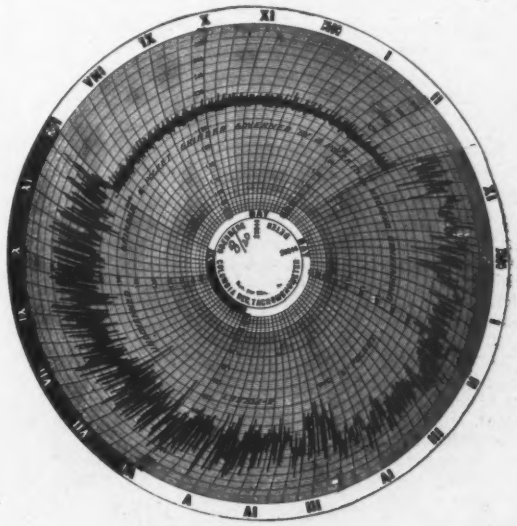

FIG. 14.
Twenty-four hour chart taken before and after installing governor. Two grinders on a line. No separate back-off pressure. Grinding pressure from constant pressure system.

times the output of those in the first. In other words, the second mill is using three times the horsepower per grinder. This corresponds approximately to the extreme conditions I have observed in the pulp mills of the country.

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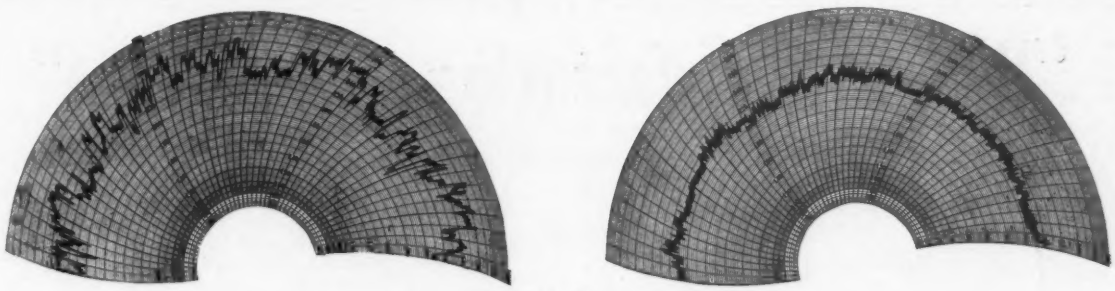

FIG. 15.

Before After

One-hour tachometer charts taken before and after installing governor.
Three grinders on a line. No separate back-off pressure. Grinding pressure from constant pressure system.

Those mills using 32-inch or 48-inch wood are able to use 33 per cent and 100 per cent more power, respectively, than the mills using 24-inch wood. On the other hand, mills using 16-inch wood are only able to use ⅔ as much power.

The approximate horsepower consumed by a pulp grinder can be computed from the following formula:

$$H.P. = \frac{P \times A \times C \times N \times R \times D \times \pi}{33{,}000 \times 12}$$

Where	Illustration
H. P. = Horsepower per grinder	500
P = Water pressure in cylinders in lbs. per sq. in.	60
A = Area of cylinders in sq. in.	154 (14" diam.)
C = Coefficient of grinding friction (Average value about 0.215)	0.215
N = Number of pockets per grinder	3
R = Revolutions of grinder per minute	220
D = Average diam. of grindstone in inches.	48
π = 3.1416	3.1416

Illustration

$$500 = \frac{60 \times 154 \times 0.215 \times 3 \times 220 \times 48 \times 3.1416}{33{,}000 \times 12}$$

Motor-Driven Pulp-Grinders

Motor-driven pulp grinders should be controlled by regulators so as to keep the grinding load as nearly constant as possible in order to secure the maximum efficiency. Since the speed of motor-driven grinders can not vary, changes in the number of pockets in use, arching and binding of the wood in the pockets, knots, and all the other factors that affect the grinding load, manifest themselves in variable power consumption of the motor. This is undesirable from the viewpoint of variable load on the electric generating plant, reduction of pulp output and impaired quality. The charge for current used by motor-driven grinders is often based upon peak load demands. Where no regulator is used these peaks often run up very high.

In this connection it is desirable to consider the relative economy of operating motor-driven pulp grinders equipped with load regulators and water-wheel driven pulp grinders equipped with governors. A water-wheel driving an electric generator must always run at the same speed irrespective of the head or gate opening. Assuming the efficiency of the water-wheel at 85 per cent when running at its best speed and gate opening, the average generating efficiency under variable head and gate opening in the ordinary hydro-electric plant is probably not over 82 per cent. The efficiency of the generator will be about 94 per cent; the transformers 97 per cent; the transmission line 92 per cent; the step down transformers 95 per cent; and the motor driving the pulp grinders about 90 per cent. This means that for every 100 water horsepower there will be 59 mechanical horsepower delivered to the pulp grinders.

On the other hand, assume a water-wheel of the same efficiency driving a pulp grinder controlled by a Meyer governor. A mere turn of the handwheel on this governor changes the speed as desired. The water-wheel can be run at its best speed for all heads. All generation and transmission losses are eliminated. Since the pulp grinder is directly connected to the water-wheel 85 horsepower instead of 59 horsepower are delivered to the pulp grinder. In addition all overhead charges on electric equipment are eliminated.

The comparison usually drawn between the relative efficiency of producing mechanical pulp with motor-driven and with water-wheel driven grinders is fallacious in that all generation, transformation and transmission losses are neglected in this comparison.

When the generating equipment is located at the pulp mill transformation and transmission losses are eliminated. Assuming the same generator and motor efficiency as before and 98 per cent dis-

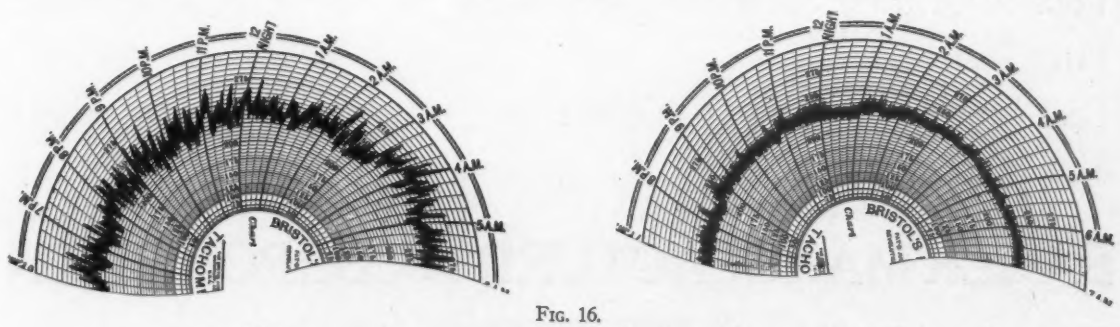

FIG. 16.

Before After

Twelve-hour tachometer charts taken before and after installing governor.
Ten grinders on a line. Separate back-off pressure. Grinding pressure from centritugal pump driven from turbine shaft.

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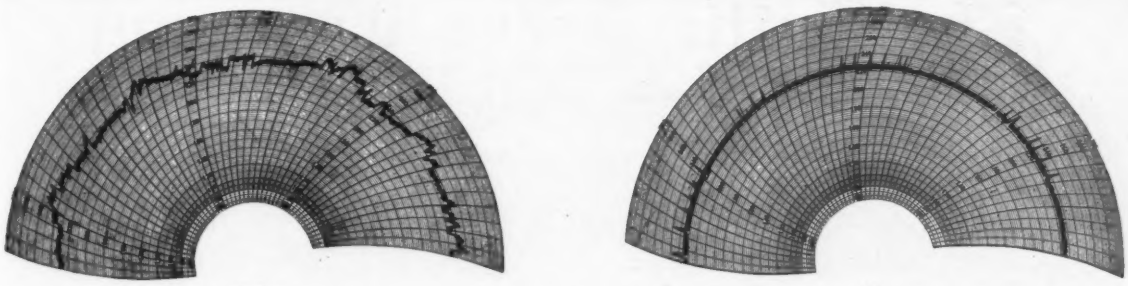


Before After

FIG. 17.

One-hour tachometer charts taken before and after installing governor.
Two 4-foot grinders on a line. Separate back-off pressure. Grinding pressure from 6-inch centrifugal pump driven from turbine shaft.

tribution efficiency, 68 horsepower are delivered to the grinders by the motor as against 85 horsepower by the water-wheel.

I am not unmindful of the fact, however, that groundwood mills can not always be economically located at the water power site. My contention is that electrification of pulp mills now in operation, or to be built, *at the power sites* is uneconomical unless the most unusual circumstances should prevail. Properly governed water-wheel-driven grinders can produce groundwood far more economically than regulated motor-driven grinders can.

Power Tests with Governed Grinder

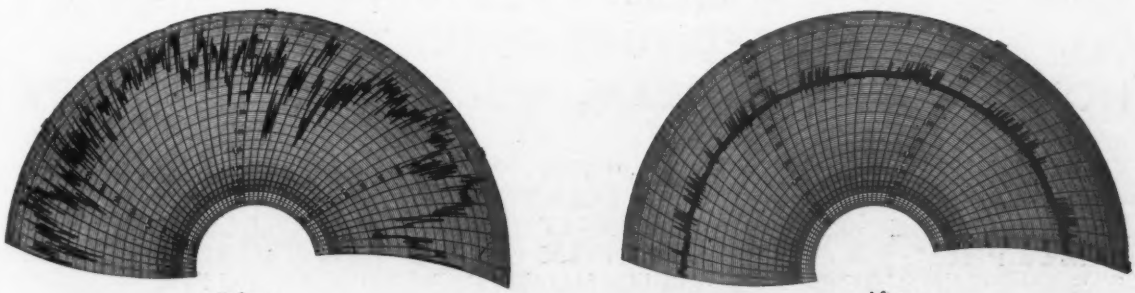
Since water-wheels must run at their proper speed to secure maximum efficiency it is of the utmost importance to know at what speed to set the governor for various heads and gate openings. Whenever Holyoke test data for similar turbine runners are available and the installation possesses no abnormal features, no further tests are necessary to determine the most efficient speeds. For the older installations, however, no such data are, as a rule, available; and moreover for installations in which long penstocks are used, wheel cases are inadequate, or tailrace conditions are poor, Holyoke test data often do not apply. Where the Meyer governor is installed power tests can be made with the governor itself at practically no expense.

In determining the most efficient speed of water-wheels with this governor, measurements are in reality taken merely of the power output, because nearly all water-wheels give maximum efficiency and maximum power at the same speeds—head and gate opening remaining constant. This fact is illustrated by Fig. 9.

In making these power tests, the grinders constitute the brake. The power developed by the water-wheel is the product of the grinder friction times speed of rotation. Grinder friction is proportional to the pressure in the pockets. Although there are a considerable number of factors in the power equation, in practice the only required observations are the revolutions of the grinder per minute and the water pressure in the cylinders. As the speed of maximum power is approached, all variables in the power equation approach a constant value, and therefore the product of pressure times speed is a measure of power.

Since the water pressure in the cylinders varies from minute to minute, for the same speed and the same number of pockets in use and often reaches differences of more than 25 per cent in a few minutes with three or four grinders on a line, and 50 per cent with one grinder on a line, it is necessary to take pressure and speed readings in quick succession. With all pockets filled and grinding, the handwheel of the governor is set for, say, 200 r. p. m. Assume that the observed gage pressure in the cylinders is 70 pounds, for example. The product of pressure times speed (70 x 200) is 14,000. The governor is then set for 210 r. p. m. This takes only a few seconds. In 15 or 20 seconds the pressure is read again. Assume the reading is 69 pounds, giving a product of (69 x 210) 14,500. The governor is next set for 220 r. p. m. The gage reads 67 pounds, giving a product of 14,800. Next, the governor is set for 230 r. p. m., resulting in a gage reading of 62¼ pounds and a product of 14,400. A reading of 240 r. p. m. gives a pressure of 56½ pounds and a product of 13,500. This series of readings has taken about 1½ to 2 minutes. Another set of readings is next taken backwards, reducing the speed from 240 to 200 r. p. m., and the two products of pressure times speed for each setting averaged, provided the pressure reading at 200 r. p. m. is reasonably similar to the first reading at that speed, indicating that no material change in grinding conditions has taken place. If, however, this reading should be 4 or 5 pounds more or less than the original pressure reading at that speed, the entire series of results must be thrown out and new observations made.

By the time one series of readings has been completed, the



Before After

FIG. 18.

One-hour tachometer charts taken before and after installing governor.
Four grinders on a line. No separate back-off pressure. Grinding pressure from constant pressure system.

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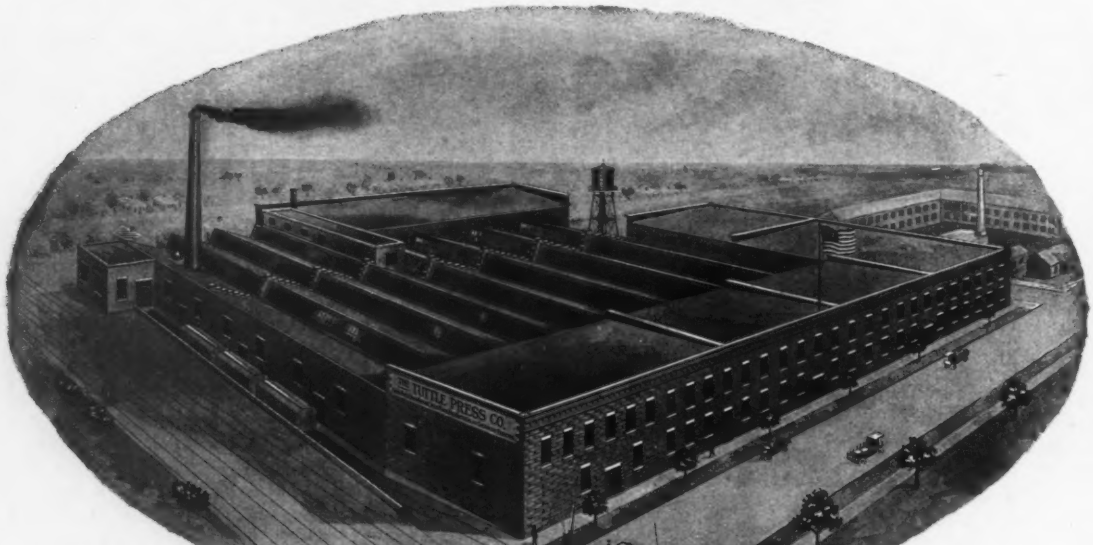

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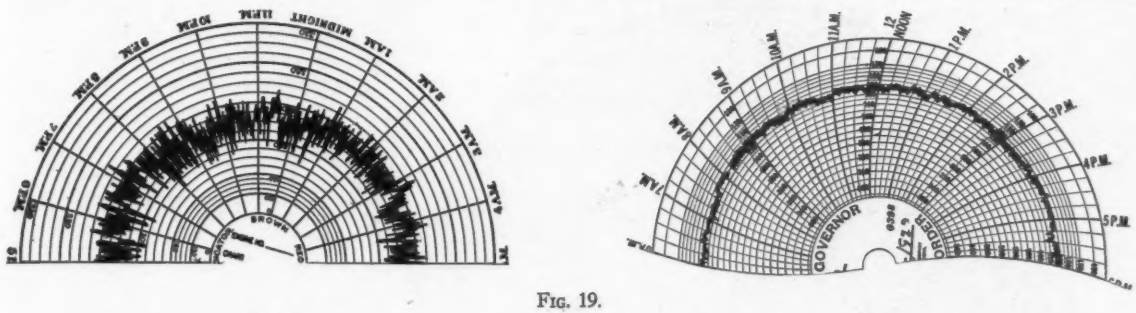


FIG. 19.

Before After

One-hour tachometer charts taken before and after installing governor.
Five grinders on a line. Separate back-off pressure. Grinding pressure from constant pressure system.

pockets must usually be refilled. A second series of pressure readings is then taken for the same speeds as before, and if the results of the second series are consistent—that is, if the products derived from the pressures observed for the same speeds are similar, even though different from those of the first series—further observations can be restricted to the three speeds giving the highest products; in this case, 210, 220 and 230 r. p. m. With all pockets grinding as before, a half-dozen pressure readings are taken at alternate speeds of 210 and 200 r. p. m., from which the better of these two speeds is selected by comparing the products of pressure times speed. Next a series of pressure readings is taken at 220 and 230 r. p. m., and the products of pressure times speed compared. These readings are repeated as often as desired until consistent and dependable results have been secured. In the present instance, it is found that 220 r. p. m. gives the maximum product of pressure times speed and therefore represents the speed of maximum power and maximum efficiency for the given head and gate opening. The best speeds for other heads are computed on the basis of the speed varying as the square root of the head. For other gate openings, other power tests must be made.

Fig. 10 is a typical tachometer chart of a power test. The positiveness with which this governor can be set for any desired speed is apparent.

Figs. 11, 12 and 13 show typical speed-power curves developed by a power test with this governor. Such curves, even though based on inexpensive tests, leave no room for doubt as to the best speed at which to run these water-wheels for the two gate openings given.

Speed Regulation Secured with Meyer Governor

Figs. 14 to 20 are tachometer charts showing the variation in the speed of water-wheel driven pulp grinders before and after the installation of Meyer governors. Under each figure is stated the number of grinders on a line, whether separate back-off pressure is used, and the manner in which the grinding pressure to the cylinders is furnished.

The small speed variations shown after the installation of the governor represent an average power loss of less than half of one per cent, or, in other words, an operating efficiency of 99½ per cent. To secure such high operating efficiency continuously it is imperative that the governor be set for the best speed from day to day, so as to force the water-wheel to run at its most efficient speed for all heads and gate openings.

In comparing these speed charts it is necessary to keep in mind that when the governor is set for the most efficient turbine speed occasional speed rises of ten or fifteen revolutions per minute, for a few seconds while pistons are actually moving, result in very little loss in efficiency because the efficiency changes very slowly at the best speed as shown by the curve of Fig. 4.

TESTING FIBER BOARD FOR STRENGTH

The strength of paper or fiber board varies greatly according to the amount of moisture in it, and this amount is continually changing with the atmospheric conditions. As the relative humidity of the air increases, the strength of fiber board declines very rapidly. A piece of corrugated board tested at the Forest Products Laboratory showed a decrease in strength, by the Mullen test, of 59 per cent when the relative humidity was raised from 65 to 97 per cent.

When fiber boards were subjected to a low, then to a high humidity, and later tested at the low humidity, the results were practically identical with those obtained before the increase in moisture. This proves that the boards had not been injured by the change in humidity, and that variations in the strength of the boards at different humidities are entirely due to a change in moisture content.

The experimental work shows conclusively that when fiber board is bought and sold on strength specifications, the humidity at which the board is to be tested must be stated.

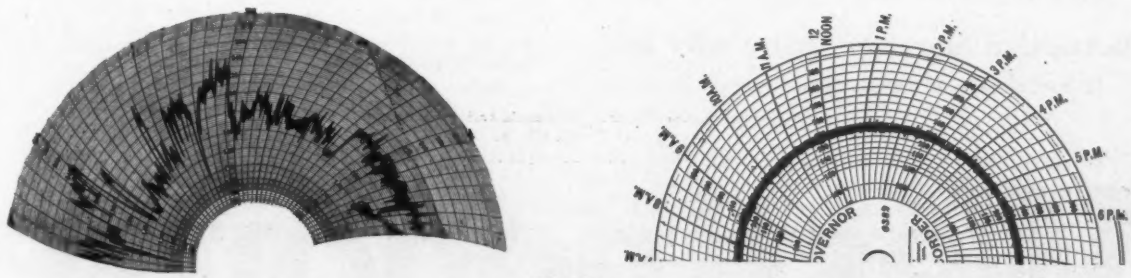
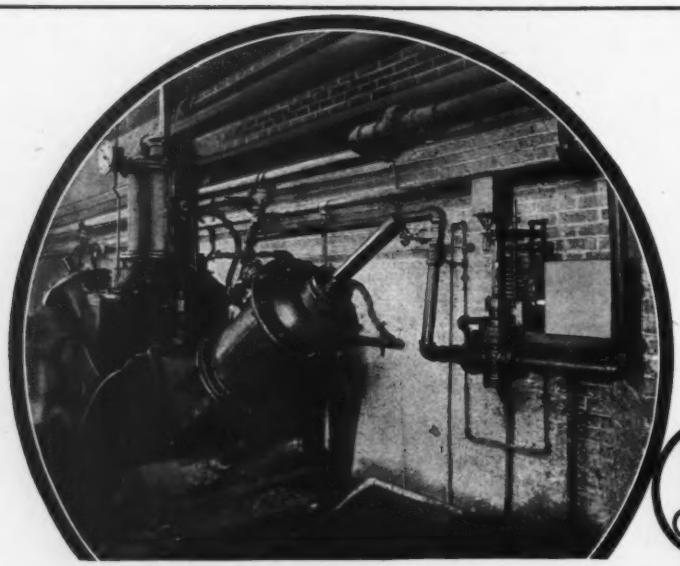


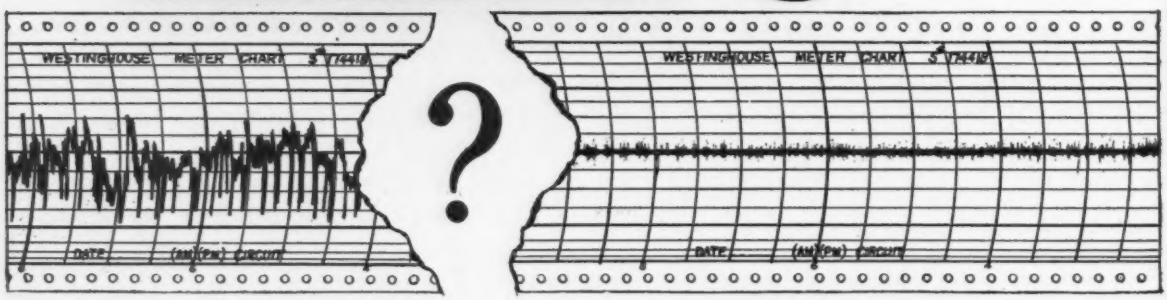
FIG. 20.

Before After

One-hour tachometer chart taken before installing governor and twelve-hour chart after installing governor.
Two grinders on a line. No separate back-off pressure. Grinding pressure from constant pressure system.



The load curves below were made at the Defiance Paper Co., Niagara Falls, N. Y. They show the regulation obtained on a single three-pocket grinder both with and without the Westinghouse load regulator.



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Sedimentation Control of Ground Wood

Read at the Annual Meeting of the Technical Association by W. A. Monroe, Chairman Groundwood Committee

The groundwood pulp committee planned last year to present at least two topics for your consideration at this meeting, but upon going into the subject of sedimentation control, one of the topics, the committee found that this subject was broad enough and interesting enough to command all their labor and attention, so the other topic was dropped for the time being.

There are two types of sedimentation or freeness testers in general use, both acting upon the same principle, but the results are measured differently, one in time and the other in quantity of water.

In both cases a known amount of stock is mixed with a known amount of water to obtain the desired consistency. This mixture, well stirred, is put into the freeness tester. Different testers vary a little in design, but consist in the main of a cylindrical metal vessel with a wire cloth bottom, generally of 65 mesh. This wire cloth is sealed with a quick acting hinged cover to prevent any premature loss through the wire. As soon as the mixture has been poured into the tester, the bottom cover is opened and the water allowed to drain through the wire, the wire meanwhile holding the stock, into a special funnel receptacle which has two orifices, one at the bottom and the other a little up on the side. A graduated receptacle is placed under the side orifice and the freeness result is measured by the amount of water caught there.

The mixture on top of the wire in the tester, when the cover is sprung, has about the same action as the stock when it first comes upon the paper machine wire; a rush of water at once leaves the stock, depending wholly upon the characteristic of the stock. If the stock is very slow, the water leaves it slowly, and nearly all is handled by the orifice in the bottom of the funnel and only a small amount, if any at all, goes into the graduate, as the stock to be tested becomes freer and the rush of water from each corresponding sample greater, a greater amount is caught by the graduated receptacle, and in this way relative freeness is determined.

In the other type of freeness tester there is no offset orifice, the funnel is of different construction and is attached to the lower part of the tester and has a drain pipe from its bottom extending into a vessel of water, to keep out the air and make a water seal. A cork is inserted in the bottom of this pipe under the water.

The mixture of stock is placed in the tester and stirred well. The cork is then removed and the time required for the water to drain off noted. This procedure is not as accurate as the graduate receptacle and not as easy and simple to accomplish. The element of error is greater. As much as 12 per cent difference has been observed by three people checking the same sample. The accuracy is considerably increased by means of a stop-watch. This is all right for laboratory, but for rough mill work, where a quick, accurate result is desired any time of the day or night, it is not practical.

The committee used both types and would recommend the two orifice type for ease and accuracy.

At first the committee was handicapped by the lack of a quick, sure means of getting the moisture content of the pulp to be tested so that an accurate mixture of the same consistency could be obtained each time. The entire accuracy and value of the test depends upon this consistency; stock of the right freeness, if mixed too thin, will give an erroneous result. It will show too free, and if mixed too thick or too rich it will give the reverse result or show slow. An undesired stock may by the inaccuracy of the consistency give the desired result at the tester, but a very wrong one on the paper machine.

This handicap has been largely overcome by the freeness test outfit (Fig. 1) manufactured by the Baker Manufacturing Company, of Saratoga Springs, N. Y. By means of the centrifuge dryer, the most important part of this outfit, an accurate moisture content can be obtained of any one sample in about a minute and a half, and the whole test run in less than three minutes.

This outfit consists of a motor-driven centrifuge, a set of accurate scales, and the freeness tester.

The stock to be tested is poured into the receptacle in the centrifuge, and the centrifuge whirled for about a minute, or until most of the water is expelled. A certain weight of this stock is then taken and mixed with enough water to completely fill the cylinder of the freeness tester. The weight of this stock should be such that when mixed with the water it will be about the same density or consistency as the stock flowing on the paper machine

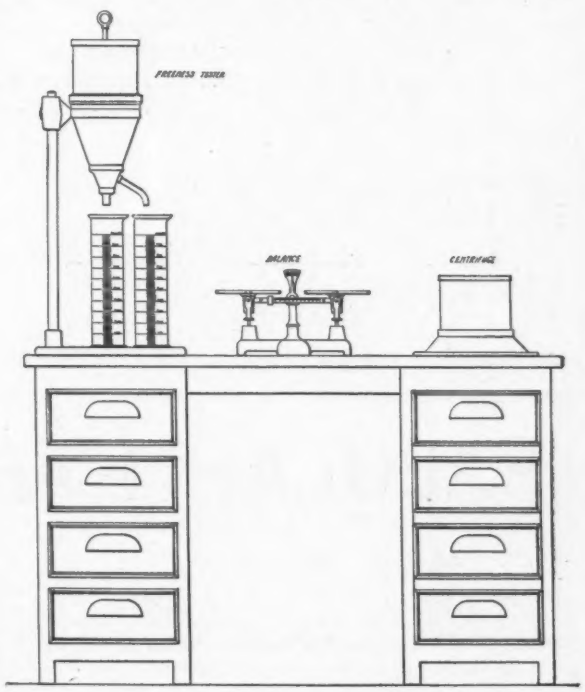

FIG. 1.

wire. It is a good plan to have a special weight made that will just balance the amount of stock desired. This will facilitate the weighing and make the time required for the test shorter.

The relative freeness of the stock is determined by the amount of water discharged through the side orifice.

It is a very good plan, in fact almost necessary, to run a check test. Some mills run three tests and take an average of them for a final result.

Freeness of stock depends on 1, wood; 2, temperature; 3, white-water.

When but spruce and balsam are used, the problem of control is not difficult, but with the use of poplar, tamarack or jack pine, in a certain proportion, greater care is necessary.

The most satisfactory way to treat mixed wood is to determine the per cent you desire to run, and then set aside so many stones in the grinder room to grind this wood on. These stones should be prepared especially for this species, and if for any reason other kinds of wood are ground on them, the freeness of the resultant stock will change.

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In other words, to secure a uniform freeness test, grind spruce on stones sharpened for spruce, jack pine on stones sharpened for jack pine, poplar on stones sharpened for poplar, and the same with any other species you desire to use.

With some species, even though the fibre is short, the result will show free, due to the sedimentation action of the fibre. This is especially true of lightweight woods with a fluffy fibre.

One of the most important things to consider in making sedimentation tests is the temperature of the test. This should be the same or as near as possible to the temperature at which the stock is run on the paper machines. When the ideal freeness of the stock in the service box of the paper machine has been determined, care must be taken to guard against any large or sudden change in temperature, or it will act exactly as a change in stock. With the temperature held fairly constant from day to day and changing only with the seasons, accurate control of the stock can be had by means of the freeness test.

The freeness of the stock varies almost directly as the temperature. For instance, stock tested at 90° F is just twice as free as the same stock tested at 45° F. The following test shows the relative freeness of the same stock tested at a range in temperature from 44° F to 90° F. In order to vouch for the correctness of the figures, three tests were made at each desired temperature.

Results of Tests

No.	Temperature °F	Freeness	Average	No.	Temperature °F	Freeness	Average
1	44	80	..	12	68	136	..
	44	84	82		68	138	137⅓
	44	82	..		68	138	..
2	47	93	..	13	70	140	..
	47	89	91		70	141	140
	47	91	..		70	139	..
3	48	94	..	14	73	143	..
	48	96	94		73	144	143
	48	92	..		73	142	..
4	50	98	..	15	75	146	..
	50	101	98⅓		75	147	146
	50	97	..		75	145	..
5	53	107	..	16	77	150	..
	53	105	107		77	152	150⅔
	53	109	..		77	150	..
6	55	110	..	17	80	151	..
	55	115	112⅔		80	154	152⅔
	55	113	..		80	152	..
7	57	118	..	18	82	155	..
	57	121	119⅔		82	153	154
	57	120	..		82	154	..
8	59	120	..	19	84	155	..
	59	120	120⅔		84	155	155⅔
	59	122	..		84	157	..
9	60	123	..	20	86	160	..
	60	125	123⅔		86	162	161⅔
	60	123	..		86	163	..
10	62	127	..	21	88	165	..
	62	125	124		88	167	165⅔
	62	130	..		88	164	..
11	64	130	..	22	90	166	..
	64	132	132		90	167	166⅔
	64	134	..		90	166	..
12	66	134	..				
	66	134	134⅔				
	66	136	..				

These results were plotted and a curve (Fig. 2) drawn to show as simply as possible the relation between freeness and temperature.

The accompanying graph shows the relation between freeness and tmperature.

Beside temperature, there are other factors of less importance that have some bearing on final stock freeness. The shutting off white water and the addition of fresh water of the same temperature will free up stock due to lack of flour, pitch held in suspension and short, fine fibres that are always present in white water.

The freeness figure of stock taken from the deckers cannot be obtained by calculating the average of the freeness of the stock from the pulp stones, due to two considerations. First, a free or fast cutting stone, one whose freeness test is high, is supplying to the whole body of stock more pulp than a slow cutting stone, and hence has a greater effect on the action of the whole body. Second, unscreened stock will always test freer, due to the presence of slivers and shives.

Stone Test and Decker Test

The following tests were obtained from 20 stones and averaged, and then compared with the deckered stock. The results follow:

	No. 1 Stones test.	Ave.	Decker Test.
1—141	11—134		
2—132	12—142		
3—114	12—126		
4— 92	13—100		
5—129	14—160		
6—126	15—150		
7—118	16—137	126.5	124
8—112	17—129		
9—127	18—126		
10—124	19—112		
	No. 2 Stones test.		
119	168		
127	160		
128	124		
114	179		
116	140		
129	168	128.3	120
108	166		
106	114		
101	100		
105	94		

In case number 1 the stones were of a fairly even freeness. The slowest was 92, the next 100, while the majority were between 112 and 130, showing a more even condition of grinding.

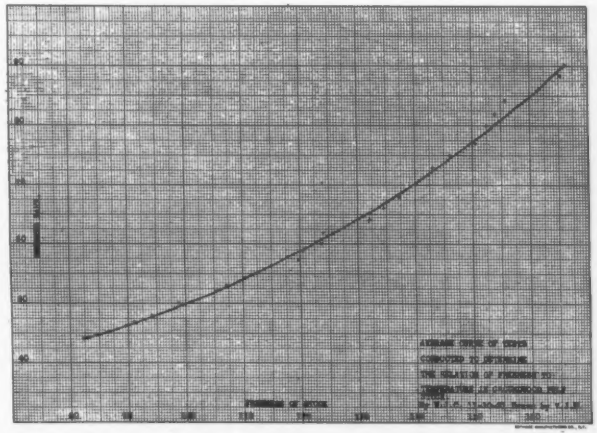

FIG 2.

In case number 2 a large number of stones (about 9) were slower or dull, four or five were right and six were quite sharp. These sharp stones brought up the average and caused the deckered stock to test about the same as in case number 1.

However, the stock in case number 1 was better than in number 2. It was much more uniform and ran better on the machines and the paper gave a higher Mullen test.

The following is the plan of stock control by freeness tester recommended by the committee:

One man on each shift is to have entire charge of the apparatus and do the testing of the stock.

The first stock to be tested is that from the service box of the paper machines. Next, the stock from the groundwood deckers and the sulphite deckers is taken. Three tests of each of these are taken and the average accepted as the accurate figure.

Then a sample of stock large enough so that two check tests may be run is taken from each stone in the grinder room.

The results are either marked up on a blackboard in the grinder room, or two slips, an original and carbon, may be made, the original to go to the tour foreman and the carbon for record. With this guidance and a knowledge of the characteristics of his stones and wood available, the tour foreman is better able to treat his grinding stones intelligently and to maintain a uniform stock.

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The Drying of Paper

Paper Read at the Annual Meeting of the Technical Association by M. B. Littlefield, Fulton, N. Y.

The drying of paper, like any other problem in this field, is the drying under given conditions bringing about the most rapid evaporation from the stock without injuring the material. The questions to be considered are:

1. Properties of paper under heat.
2. Drying conditions.
3. Heat supply.
4. Removal of water vapor.

These factors and their subdivisions determine the drying rate and therefore the production of any particular piece of equipment. After a preliminary discussion of the factors involved a few drying curves will be explained.

Properties of Paper Under Heat

Paper is a material which is not injured by heat while wet, but seriously injured for its designed use when subjected to heat while dry. This, of course, is relative. A piece of paper saturated with water may be held in the flame of a Bunsen burner at a temperature of 1,900° F., and it is not injured by the flame until the water content becomes so low that the sheet changes from a black color to dark gray, indicating a very low moisture content. If, however, a piece of dry felt is held in the same flame, it is immediately destroyed. Now consider the temperature of drying steam 220-260° F. The same statement holds, but the period of time becomes longer. Wet felt is not injured by heat, but dry felt is still injured at a much lower rate, however, than in the case of the flame of 1,900° F. When felt is held too long or subjected to too much heat on the surface of a drum dryer, it hardens on the outside.

If now a sheet so treated is bent through an arc of 180°, it cracks and the surface scales off somewhat like flakes of rust from old sheet iron, except that the flakes of felt do not fly off as in the case of rusty iron. The pliability of the sheet is decreased. This renders the felt unsatisfactory for the manufacture of asphalt roofing shingles. The drying must be so regulated that the felt does not "case harden" on the outside. The question is somewhat complicated by the variety of felts. They vary, depending on their use in the following properties:

1. Thickness.
2. Furnish.
3. Freeness, compactness or thickness ratio.
4. Entering moisture content.
5. Final moisture content.
6. Critical moisture content.

A change in any one of these properties changes the paper. The thickness as determined by the caliper of the sheet in thousandths of an inch is a direct function of the weight. All other conditions the same, if the weight is doubled, the thickness is doubled. If the per cent moisture has remained the same, as is assumed, there is just twice as much water to be evaporated per square foot of paper surface. The machine must be slowed down.

Whether the furnish is ground wood, chemical pulp or rags, determines the temperature the sheet can stand without injury. Paper box board must have a relatively low temperature of drying in order not to injure the wood fibers, which are there either as groundwood or sulphite pulp. Roofing felts can stand a higher temperature. It is thus seen that the furnish plays a very important part in regard to temperature and therefore steam pressure.

The thickness ratio expressed by the caliper divided by the ream weight, indicates the compactness of the sheet. The more open, or less compact, the sheet, the greater the capillary action in leading the moisture from the center to the surface to be evaporated. The more open the sheet, the more rapid the drying rate and greater the production.

The entering moisture content as expressed in pounds of water per pound of bone dry stock, determines the amount of evaporation. The greater this ratio, the longer the time required to dry the paper. This is a measure of the efficiency of the wet end.

The final moisture content expressed in the same manner varies with different papers. Felts for saturating baths must have a very low moisture content, for the water boils over the bath if it is too high. Felts not for saturating baths as deadening felts and fillers do not require such a low moisture content. Although it is but a few per cent higher, it has, as will be shown later, a marked effect.

The critical moisture content is the pounds of water per pound of bone dry stock that leaves the concentration of water uniform throughout the cross section of the sheet. A sheet can be so wet that there is a film of water on the surface. This evaporates at a constant rate, but as soon as water has to diffuse by capillary action from the center of the sheet to the surface in order to be evaporated, the drying rate slows up due to this lag. This point where the drying rate changes from a straight line function in one direction to a straight line function in another direction, is the critical moisture content. It varies for different papers and different drying conditions. It therefore becomes necessary to arrange drying conditions to satisfy the above characteristics of the paper so the most rapid satisfactory drying rate is maintained.

Drying Conditions

Drying conditions are usually characteristic of a particular type of equipment through a small possible range for variation. Sludges, milk, soap and paper are all dried under conditions varying but little in their own range. Sludges may be dried by hot flue gas, milk by gas at a much different temperature and humidity, soap at its particular requirements, and paper by conditions satisfactory to it. The drying of paper on a paper machine with wet end, and drum dryers arranged in the usual manner, is type of equipment considered.

The sheet is formed on a cylinder mould in a vat containing a fiber suspension of about 0.5 per cent. This sheet on leaving the cylinder mould contains from 13 per cent to 15 per cent dry stock. The remainder, being water, must be removed before the product is ready for shipment. It can be done by either pressure between press rolls, suction combinations of the same, or by heat. The following table shows the relation between the work done by the usual equipment of a wet end:

Basis Lbs. Water Per 100 Lbs. Dry Stock

		Per Cent Water
After cylinder mould	600	85.7
After suction	450	81.8
After first press	180	64.3
After second press	160	61.5
After dryers	6	6.

or, expressing it in per cent dry stock on wet end basis:

After cylinder mould	14.2
After suction	18.2
After first press	35.7
After second press	38.4
After dryers	96.

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Data like this shows some interesting facts. Of the total water removed, the work was done as follows:

	Per Cent
By suction	25.0
By first press	45.0
By second press	3.
By dryers	26.0
Remaining in felt	1.0

Why not remove more of it by press rolls? The caliper of the sheet is decreased too much. The sheet is crushed. How much is caliper worth? This is answered as follows: Let it be assumed

1. 100 tons product per day.
2. Heat by vaporization of water is 1,000 B. t. u. per pound.
3. 4,000 B. t. u. per pound of coal fired in boilers utilized for good work in drying felt.

This varies with the peculiarities of the mill, as length of steam distribution lines, amount of heat insulation on them, heat losses of machine and climate. But 4,000 B. t. u. per pound of water is good practice.

4. Coal costs $6 per ton at mill.
5. 600 pounds of water per 100 pounds stock after the cylinder mould.
6. That 2 per cent more of the total water is to be removed by press rolls, or that much less to be evaporated on dryers.
7. A 300-working-day year.

A simple calculation with the above figures shows that the coal necessary to generate heat to evaporate this additional 2 per cent more water costs $5,400 per year. Other factors now come into consideration, as the cost of additional power to drive presses due to the heavier leverage to remove this water and the life of the press felt. There are no figures available as to this cost but a qualitative consideration of conditions shows this to be small. The variation in the life of press felts due to various factors is so great that this variability could not be held constant, while the decreased life is determined. The wet roofing felt is so sensitive to pressure that the increased cost of power and press felts is at any rate small. The conservative assumptions will no doubt overbalance this liability and leave a saving of over $5,000, due to the removal of 2 per cent more water by press rolls.

Heat Supply

The quantity of heat supplied by the steam at the machine must be enough to heat up the stock to the temperature of vaporation, to vaporize the water, and to supply heat losses under the drying conditions existing. This will, of course, depend on the capacity of the machine and the per cent of water in the entering stock. Such facts as the decreased capacity of a machine in winter as compared to summer are generally known facts around mills, but it is little appreciated that about 10 per cent of the total heat used for good work in the machines is used to heat up the stock to the temperature of vaporation of water. It is a considerable factor. The temperature of vaporation is beyond the control of man, in that it would not be feasible to put a paper machine under a vacuum covering to get the slight benefit due to lower total heat of water vapor at lower temperature of vaporation. The heat losses are, however, well within the scope of every mill and should receive consideration due to splendid returns.

The rate of evaporation as determined by the heat supply must be considered in respect to the following:

1. Kind of steam.
   (a) Quality.
   (b) Pressure.
2. Circulation.
3. Removal of condensate.
4. Removal of water vapor.
5. Removal of air.
6. Condition of dryer shell.

The kind of steam governs such factors as quality of steam, temperature gradient through shell, the heat of vaporization, and the air and water films on the inside of the dryer. The first requisite is dry steam entering dryers. There is enough water there from condensation without blowing in more water by improper steam generation or distribution. The proper insulation of all pipes is a well paying investment, in that it decreases both direct heat losses from itself and insures dry saturated steam entering dryers. The steam should be as high a pressure as possible considering the quality factor. Assume temperature of sheet 200° Fahrenheit. Data shows the variation in the temperature difference.

Steam Pressure Lbs./Sq. In. Gauge	Temperature °F.	Temperature Difference
6	230	30
13	245	45
21	260	60
30	275	75
50	298	98

Now the equation for heat transfer is

$$Q/\Theta = h\ A\ t$$

The Q/Θ means the B. t. u. (heat units) transmitted from the steam to the paper in a unit of time (an hour); A is the area of contact between the sheet and the dryer in square feet; t is the temperature difference between the steam and the sheet, while h is the coefficient that satisfies the existing conditions. h is expressed as B. t. u. / sq. ft. /° F. /hr. The factor 1 which occurs in the denominator is omitted as no measureable thickness changes once a machine is constructed. If now every factor on the right is constant but t, a change from 6 to 21 lbs./sq. in. pressure just doubles the heat transfer, the heat supply, and therefore the production. This is closely substantiated in practice, as these figures show:

Operating Pressure Lbs./Sq. In.		Lbs. paper/sq. ft./hr.
1.	55	0.94
2.	15-25	0.50

The pounds of coal burned per ton of paper produced was approximately the same in each case. The first machine therefore had a lower manufacturing expense due to smaller overhead per ton. Dry saturated steam at as high a pressure as possible without injury to the felt is always desirable.

Circulation is necessary to efficient operation. It governs the water and gas films inside of dryer. The water film on the inside of the dryer shell is kept down by removing the condensate by any one of the dippers or siphons used. There is little opportunity to get any high velocity over the inside of the dryer shell and thus derive the large increase in heat transfer due to this velocity, but it can be materially increased by proper circulation. Data on velocity inside a dryer would be difficult to get but data on heat transfer coefficients from steam to water of varying velocities shows this effect. It is very marked. Pressure drop from steam headers through dryers to water headers gives circulation, thinner water film, and therefore better heat transfer.

Gas films due to non-condensable gas in steam are a source of trouble which should not exist, but it often occurs. This data shows its effect.

Per Cent Non-Condensable Gas	Heat Transfer Coef. (h)	Per Cent of Maximum
0.0	2900.	100.0
2.0	460.	15.8
5.0	29.	1.0
50.0	10.5	0.36
100.0	10.0	0.35

h is the B. t. u. /sq. ft. /°F. /hr. through the steam film on dryer for dry saturated steam with the above percents of air. Notice the marked drop caused by only 2 per cent of non-condensable gas. Any trace of non-condensable gas is detrimental. Leaks in from the outside do not exist due to excessive pressure on inside trying

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to get out, air coming in through steam supply does occur. All air cannot, however, be removed. Water dissolves air the same as it does salt, chlorine, etc. For conditions of open feed water tanks water dissolves about one one hundredth (0.01) of its volume of air. This must of necessity get into the dryers. But air entering other ways should be stopped. A steam jet for feed water might suck air which would show itself in the dryers and cause an air film.

The water, water vapor and air must be removed from the dryers. Siphons or dippers take water to headers where steam traps let it flow to vacuum pumps or hot wells for return to boiler house. This water may be so hot that it "flashes" under reduced pressure. Cold water must then be run in to kill the steam or this water and steam can be used for heaters. The latter is by far the more economical. Air may be removed by vacuum pumps or by blowing off the dryers.

The inside and outside surface of the dryer shell requires attention. Oil films and rust on the inside surface and bunches of fibers, "scabs," on the outside reduce the proper transfer of heat through the shell from steam to felt. An increase of a few hundred pounds production per hour is always noticed after dryers have been scraped and cleaned. This enables the sheet to get better contact with the dryer and prevents the air from coming between the shell and sheet, giving a gas film of low heat transfer.

Removal of Water Vapor

The question of heat supply has been considered. It is now necessary to get the water vapor away from the sheet. There are many types of air systems on the market for this purpose but they are all judged on the same basis. They must have, first, capacity to carry away the water vapor; second, be able to produce a humidity difference between the water vapor on the sheet and the humidity of the air carrying the water; and third, they must have velocity past the sheet. It comes to the simple analogy of drying clothes. This may be done on a dry day with no wind or on a damp day with much wind. A dry windy day is of course best. The dry day produces humidity difference between the clothes and the air. The windy day produces velocity. Just as a combination of these two facts is best for clothes, so is it for paper and any other material to be dried. An economical balance between the efficiency of a system judged by the three factors and the cost of producing the same, immediately gives the best system first place.

Assuming all systems giving enough air at a temperature 120° F. and dew point of 60° F., a consideration of the factors of humidity difference and velocity past the sheet can be made. There are three general types; first, blowing hot air in under roof and allowing it to come down, pass under hood, and escape through monitor on roof; second, blowing it into pit under machine and allowing it to rise through machine to monitor; and third, blowing it in between dryers on machine and allowing it to rise to monitor. The various types of monitors, i.e., natural ventilation, the whole length of machine, stacks at different intervals, and suction fans, or the waste heat recovery systems will not be considered. The effect of the natural ventilation is shown by humidity difference and velocity in the machine; the latter is too large a field and is, of course, outside the scope of this brief article.

The system of blowing hot air in under roof and allowing it to come down and pass under hood, and then escape to monitor on roof has a wide range of possibilities. Drafts from adjoining rooms can spoil the natural circulation. The distance the bottom of the hood is above the top of the top dryers determines how near the air comes to the sheet. It can be so far up that it only helps by creating currents up through the hood. The water vapor rising from the machine is caught by these rising currents and given a little pull out through the monitor. A very inefficient arrangement. Now let the hood come down to the top of the top dryers and have canvas, sheet metal, or even vertical sides continued down about one-third the height of the dryers. The hot air has much better contact with the sheet, has a chance to become more saturated by the rising water vapor, and carries this water out because it is an integral part of the gas and not because of rising convection currents. But this hot air usually only hits the edges of the sheet. The air between the dryers is of a higher temperature than the hot air blown in. It tries to rise or escape around the edges. The hot air rushing down tries to get in between the dryers. It compresses the air already there. The harder it presses the more compact the air in the center between the dryers becomes. It can never be wholly removed this way. (These differential pressures are, of course, very small.) The hot air following hits this compressed air, which is as solid as the ends of the dryers from the aspect of circulation and therefore goes up the sides. A great deal is gained by lowering the hood but there is still chance for improvement. The humidity difference and the velocity of hot air past the whole sheet must be increased.

Let us now assume the same complete hood coming partly down the side but blowing the hot air into the pit under the machine. We have taken advantage of the tendency of hot air to rise and are not compelling it to come down and pass under a hood before it can escape. It is started at the bottom. It can now rise into the pockets under the dryers where the air was compressed in the previous case, and like squirting a hose against a barn door it spreads out to the sides, rises through the hood and escapes. Circulation has been started, humidity difference and velocity past the sheet have increased. But suppose there were bottom dryer felts on the machine. This could not be.

The hot air must be blown into the pockets between the dryers either the whole length in the form of a spray or in the form of two blasts of air playing from the center of the face of the dryer to the ends. This arrangement gives hot dry air close to the sheet ready to absorb and carry away the water vapor as soon as it is formed, thus giving a high humidity difference and increased velocity. This air is always moving, the faster the better, decreasing thickness of the water film on the sheet if it has not reached the critical moisture content, allowing more rapid diffusion of water through the fiber to be evaporated, and increasing the heat transfer from the hot air to the sheet. This system does not go contrary to any tendencies of nature and helps out those that can serve the needs.

But what about the mechanical difficulties of such equipment? They have nearly all been overcome. It does of course add more equipment for care, but its advantages far offset momentary inconveniences in operation.

Drying Curves

We have considered the conditions under which paper must be dried, the means of producing these conditions by equipment, heat supply, and removal of water vapor. We will now look at some curves and try to show the effects of the various factors mentioned.

Three tests of the following data will be considered:

		A	B	C
1.	Number of dryers	72	54	54
2.	Diameter of dryers (inches)	48	36	36
3.	Area of dryers (sq. ft.)	10,450	3,650	3,650
4.	Speed of dryers (ft./min.)	75	59	84
5.	Pressure (gauge lbs./sq. in.)	15–25	55	55
6.	Ream weight (1 sq. ft./480)	54	70	52
7.	Temperature of inlet stock (° F.)	40	52	38
8.	Temp. of finished stock (° F.)	200	200	200
9.	Production (lbs./hr.)	5,400	2,760	2,920
10.	Lbs./sq. ft. Area/hr	0.52	0.76	0.80

Lbs. Water/Lb. Dry Stock

		A	B	C
11.	After cylinder mould	5.62	5.79	6.16
12.	After suction	....	3.17	3.66
13.	After first press	1.78	1.49	1.55
14.	After second press	1.44	1.20	1.40

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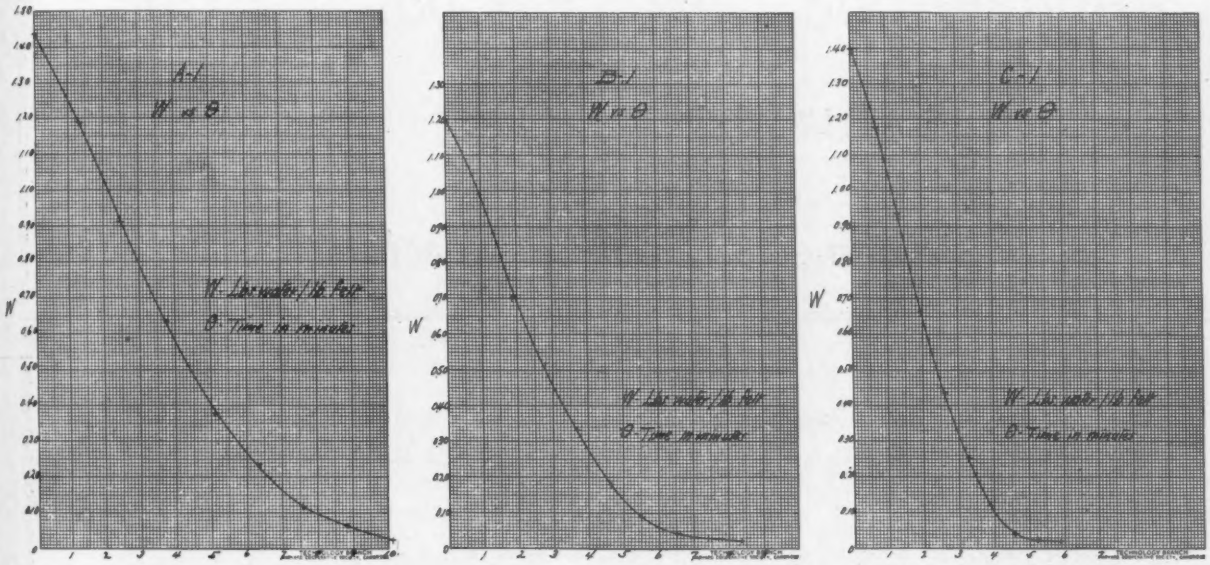
Plots A-1, B-1, and C-1 give the drying curve, i.e., pounds of water per pound of dry stock (W) vs. time (Θ). Plots A-2, B-2, and C-2 give the pounds of water per pound of dry stock (W) vs. the drying rate (dW/dΘ), i.e., W vs. the slopes of curves A-1, B-1, and C-1, at the various values of W.

Run A was on a machine well covered with a hood, hot air being blown into room under room. Runs B and C were each made on another machine. This machine was well covered by a hood with hot air being blown into wet end of room. Both machines were equipped with monitors which removed the water by natural circulation. Items 1-10 inclusive need no explanation. The samples for the data in the drying curves were taken at different intervals along the machine. These sections were selected so that each one was symmetrical to the rest. This made no variation in length of path between dryers or area of contact on dryers. The time elapsed for a particle to pass through could then be divided by the number of sampling stations to get the exact time between each sampling station. There were no steam meters on the two machines so that the only comparison of heat used that could be made is between the pounds of coal burned per ton of felt produced for the two machines. As both machines were in different mills which differed in construction, this comparison would not be fair to either machine because they would be charged with the heat required for the rooms. By this comparison, however, the machine of runs B and C showed better efficiency than the machine of run A.

In order to explain the curves the following case is cited: If a man traveled in his car from Albany to New York and kept a record of the distance he was from New York at each hour and then plotted the distance against the corresponding hour, he would get a curve similar to curves numbered one (1). Now in going out of Albany traffic impedes his progress. He goes only twenty miles per hour. In an hour he makes but little headway. When he gets out into the country he goes faster, say forty miles per hour. He decreases his distance from New York more rapidly at this rate than at the former rate of twenty miles per hour. Again when he approaches New York traffic slows him up. He covers less ground in an hour until finally he stops. Now curves numbered one (1) are nothing but the moisture content of the stock away from the desired zero or the distance the man is from New York. Curves numbered two (2) are the rates at which water is removed at any particular water content of the stock or the speed of the man at any particular point on his trip.

Keeping in mind this simple analogy, we can now discuss the curves and data. From the above data it will be seen that there was but little difference in the water content after cylinder mould even though there is considerable difference in ream weight. The press rolls, however, did much more work in the heavier sheet. A heavier sheet can stand more pressure with a smaller percentage decrease in caliper. There is, however, much more water per square foot of paper surface in the case of run B. The machine must be slowed to evaporate it. On curves A-1, B-1, and C-1 note the slight convex part at the beginning, the straight portion through the middle, and the large part of the dryers used to get out the last few percent. These same characteristics show themselves in A-2, B-2, and C-2 by the lag in getting up to maximum drying rate, the flat portion of the curve in the middle, and the dragging off at the end. The lag at the start is due to the utilization of the heat supply to bring the stock up to temperature of vaporization and penetration of excessive condensation, which should, however, be removed by extra large steam traps. Because of the large amount of water on the surface of the sheet, the lag at the beginning does not show the full amount of heat used for this purpose. The pounds of steam used to evaporate a pound of water on the dry end is much more than on the wet end. Comparison of slopes at the two ends is, therefore, impossible.



The difference in the drying rates at the middle of the curves is significant. The lighter sheet is on a larger machine and at lower steam pressure (run A). After the sheet is heated up to the temperature of vaporization the water diffuses from the center of the sheet to the outside at the same rate that it is evaporated. The drying rate is, therefore, constant until the water does not diffuse out as rapidly as it is possible to evaporate it. It then drops off. This point is the critical moisture content. Now compare runs A-2 and C-2. Both are nearly the same weight. The effect of the higher pressure is shown in the higher drying rate 40 against 22.

In the case of the heavier sheet on a smaller machine at much higher steam pressure, the water is evaporated much faster than it can be supplied from inside the sheet. The drying rate immediately drops off, the heat is apt to be excessive and the surface of the sheet is burned. This is then the condition that must not exist if the best quality is to be maintained. If the steam pressure is cut down, the sheet cannot be dried as quickly and production is curtailed. There is then a balance between quality and quantity which must be decided by each mill.

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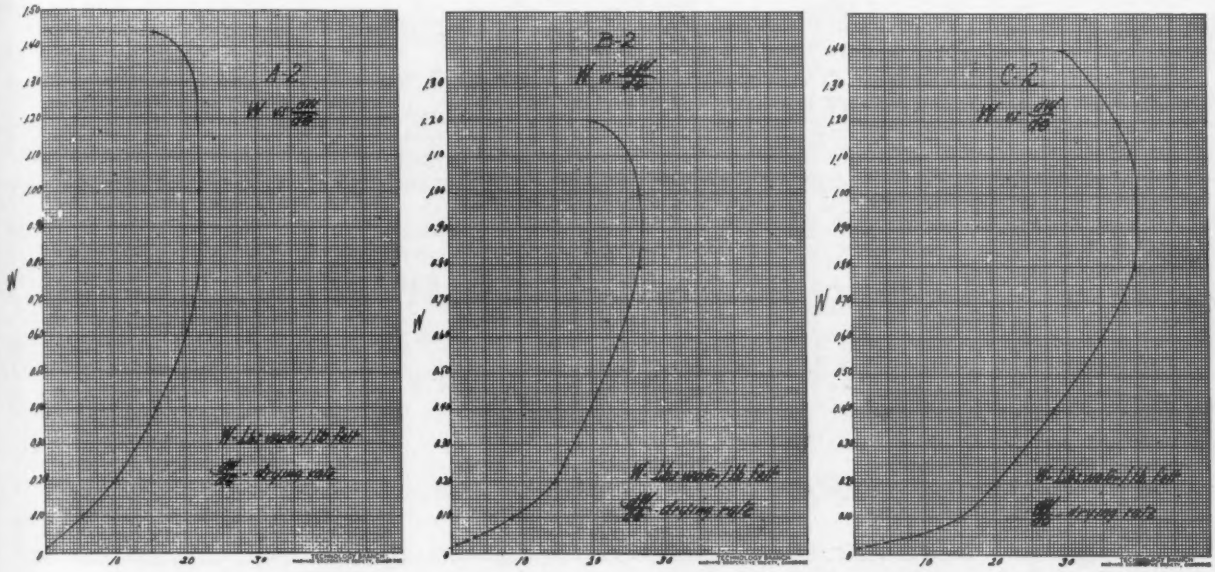
It will be noted that the critical moisture content comes at the same point on each curve, i. e., W = 0.80. This is shown to be the case in a number of tests not here listed. There being more water in the heavier sheet and it being dried quicker on the surface, the rate stays larger for a period below the critical moisture content until this water gets to the surface. It then slows up like the lighter sheet. Curve A-2 is the desired curve and the extent to what it is approximated depends on the quantity-quality balance of each mill. Drying theory would require that it take just as



long to dry from .40 to .20 as from 0.20 to 0.10 or 0.10 to 0.05. The curves closely substantiate this below the critical moisture content. The fact that from W-0.80 to the end, the curve is not straight, is due to the capillary action of the paper fiber which causes the deviation. The diffusion of the water to the surface by capillary action seems to be some function of the water content. This seems reasonable when it is considered how much more difficult it is to wet dry cellulose than when partially wet. In the first case the water stays as a drop; in the latter case it spreads immediately. The same condition exists in the cross section of a piece of paper.

These curves show the effect of steam pressure on production The quality of the product, the other arm of the balance, cannot be so easily shown, but as has been previously stated, this must be a matter decided by each mill. The curves and a consideration of the effect of heat on paper also show the desirability of placing the high pressure steam on the wet end of the dryers if a system of circulation based on pressure drop through dryers is used. Ordinarily, heat cannot injure wet paper, therefore have the high pressure on the wet end to raise the stock rapidly to the temperature of vaporization and start a high drying rate, then as the paper becomes more susceptible to heat lower the pressure so as not to injure it. This is nothing but the principle of parallel flow used in all careful controlled drying. With this system the quality must improve, but the saving on coal due to the efficiency of localizing the maximum heat or getting better heat transfer by circulation cannot be stated because of insufficient data.

Control of Drying

From the factors involved, it seems that some means of control other than the number of dryers back where steam ceases to rise from the felt should determine the efficient operation of the machine. A machine crew needs a drying oven and scales in the same manner that a fireman needs a steam gauge or an automobilist needs a speedometer. The final moisture content is the standard toward which the crew should work. If 6 per cent is the standard and it is 6 per cent ten or twelve dryers back, speed up the machine until it is 6 per cent just two dryers back. Curve A shows good operation. There is no need to go farther than to mention the possibilities of increasing the capacity of the machine by control. Drying ovens, speedometers, pressure gauges and accurate records are necessary to paper drying control.

The object in paper drying as in all other drying is to design equipment and so control the supply of heat and the removal of water vapor that the maximum desired quantity and quality of product is obtained.

TO BUILD PULP MILL AT MONROE, LA.

The Southwest Pulp and Paper Company of Monroe, composed of New England business men and others of the East, has purchased 18 acres of land from W. M. Parker of Monroe, La., to be used as a site for a pulp and paper factory, which will be constructed during the next year. The tract is located on the Missouri Pacific Railway and the Monroe-Columbia highway, a few miles from Monroe.

The construction of the pulp and paper mill by the Southwest Pulp and Paper Company is regarded by business men as one of the most important steps in the industrial advancement of Monroe. It is said that not less than a quarter of a million dollars will be put into the plant.

WAYAGAMACK BONDS

Wayagamack Pulp & Paper Company, Three Rivers, Que., has disposed of an issue of $1,374,000 to a syndicate of Montreal and Toronto houses, headed by a large Montreal firm. The proceeds of the issue will reimburse the company for months on capital account for the installation of two new paper machines, alterations to increase the capacity of the two original machines, necessary additions to steam plant and new electrical equipment. With the additions the annual capacity of the company's plant will amount to 78,000 tons of kraft pulp and 39,000 tons of kraft paper. The company now owns 2,056 square miles of limits. The St. Maurice River limits amount to 1,121 square miles, the Portneuf River limits 484 square miles, and Gaspe Yorke River limits 451 square miles.

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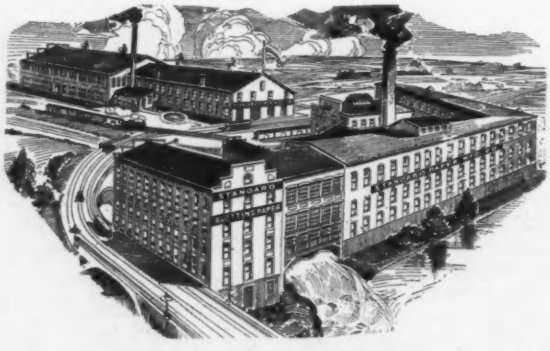

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The Electric Steam Generator

Read at the Annual Meeting of the Technical Association by Horace Drever and Frank Hodson, of the Electric Furnace Construction Co.

I. The object of this paper is to set before the men of the pulp and paper industries a recent development in the conversion of electric energy into steam by means of the electric steam generator. The theory underlying will be touched on briefly, while stress will be put on the practical application.

Brief History of Electric Steam Generator

II. In Europe the conversion of surplus hydroelectric power into steam has been practiced for ten years, and particularly during the last five years has grown remarkably under the stimulating influences incident to the war. There are over three hundred installations known in Italy, France, Switzerland and Scandinavia,* countries, it will be noted, which have an abundance of water-power and are lacking in coal resources. These generators are used in a variety of industries that need steam for heating and are largely of the electrode water resistance type, i. e., they generate steam by the passage of high voltage current between electrodes immersed in water, which is thus heated to steaming temperature. Much success has attended the installation of electric boilers in these countries because they supplied a ready and economical substitute for scarce and expensive fuel.

Little had been done in America along these lines until F. T. Kaelin, of Montreal, took up the development of an apparatus that would be simple, low in first cost, and reliable in operation, with the ultimate purpose of utilizing the surplus hydroelectric power available. The results of his exhaustive experiments have justified the time and expense involved. The illustrations shown at the end of this paper are concrete evidence of this fact. During the same period F. A. Lidbury and F. A. Stamps were experimenting with a low-voltage, small capacity generator, the results with which they embodied in a paper read before the American Electrochemical Society last fall.** It is not known to the author whether they have proceeded further with the development of their apparatus.

Various projects for employing direct or alternating current resistors passing through the tubes of a tubular boiler have been proposed, but on account of the great first cost and complexity of control, have apparently not progressed much beyond the proposal stage. This type has the advantage of being able to use either alternating or direct current, but except in isolated cases this consideration is more than offset by the disadvantages previously mentioned. We shall not refer again to this type, but confine ourselves exclusively to the water resistance of electrode generator.

Having thus briefly touched on the progress of development of the electric generation of steam, we will go on to discuss the principles underlying the conversion of electric energy into steam.

Principles

In the electric steam generator all the energy of the current is converted into heat energy by the passage of the current through water resistance, the whole process being governed by the principles of Ohm's Law, which simply states the relations of voltage, current and resistance. When current flows against resistance, energy is dissipated in the form of heat. One kilowatt hour is equivalent to 3412 B.t.u. Disregarding losses for the present, this amount of heat represents that required to evaporate 2.97 pounds of water at 32° F. into steam at 212° F. (or 3412 ÷ 1147 equals 2.97 pounds). If we consider steam at 150 lbs. gauge, feed water temperature 150° F., the heat to be supplied will be 1193—(150—32)=1075 B.t.u. per pound of steam. One k.w.h., therefore, will evaporate 3412÷1075 or 3.17 pounds.

The efficiency of the apparatus is high. The losses are those due to heat carried away by the bleed water and to radiation from the boiler; but since both are very small compared to steam output, even for small uninsulated generators, the efficiency may be taken as 95 per cent. For the larger units, with proper lagging, the efficiency may safely be taken as 98 per cent. Using this figure, the quantities given in the preceding paragraph should be changed to correspond, viz.:

(a) Feed water at 32° F.—1 k.w.h. is equivalent to 2.90 pounds of steam.

(b) Feed water at 150° F.—1 k.w.h. is equivalent to 3.10 pounds of steam.

Under average conditions one pound of soft coal of about 12,000 B.t.u. evaporates 8 pounds of water; one ton of 2,000 lbs. evaporates 16,000 pounds of water. The electric energy required to evaporate the same amount (16,000 lbs.) is equal to 16,000÷3.10=5,161 k.w.h.=215 k.w. days=0.59 k.w. year=0.8 h.p. year. In other words, 215 k.w. in an electric steam generator is equal to one ton of coal per day burned under average conditions of boiler efficiencies.

The relation between the capacities of the coal-fired boiler and the electric steam generator may be expressed as follows: One b.h.p. is defined as equivalent to 34½ lbs. of water evaporated from and at 212° F. per hour and represents 33,479 B.t.u. per hour. One k.w.h. at 98 per cent efficiency equals 3,344 B.t.u. per hour. These figures are almost exactly in the ratio of 10 to 1, therefore,

(c) 10 k.w.h. in a steam generator=1 b.h.p., or

(d) 13½ e.h.p. hours in a steam generator=1 b.h.p.

Design

The design of an electric steam generator involves fundamental consideration of the length of path of the current through the water. For a given voltage this distance is determined by the composition of the feed water,—the amount of salts and impurities contained therein, etc. No hard and fast rule can be laid down for the relations governing this distance between electrodes before the feed water conditions are known. In general, it may be stated that any water that is suitable for use in the ordinary boiler can be used in the electric generator, with one important difference; that is, it is neither necessary nor desirable to add chemicals to the feed. Impurities to a reasonable amount and scale are removed by bleeding a small percentage of the input constantly, this amount varying from 2 per cent when condensate is largely used, to a maximum of 20 per cent when cold raw water constitutes the feed. It might be objected that when so large a percentage of the feed water is drawn from the apparatus the thermal losses would be large. That this is not so is apparent from the fact that the bleed water is drawn from the bottom of the vertical shell and near the feed inlet, hence the discharged waste is only slightly above the temperature of the incoming supply.

Constant conditions are attained in the water by the bleeding referred to above. It has been determined through experience that the resistance can thus be controlled over a considerable range according to the amount bled.

In order to maintain a constant steam pressure the generation of steam has to follow the demand closely, which requires regulation of power input to steam demand. This is accomplished by varying the resistance, either by changing height of water, by changing amount of water fed or by suitably adjusting the amount of bleed water.

*F. T. Kaelin—"Generation of Steam by Electricity," Eng. Institute of Canada, Jan. 19, 1922.
"Electric Steam Generation in Switzerland," Power, Vol. 52, p. 596.
"Making Steam Electrically in France," Power, Vol. 53, p. 404.
"Electric Heating of Steam Boilers in Sweden," Power, Vol. 53, p. 746.
"Some Types of Electric Steam Boilers," F. Holmgren, Trans. Iron Institute of Sweden.

**F. A. Lidbury and F. A. Stamps, "An Electric Steam Generator for Low Voltage," Trans. Amer. Electrochem. Soc. Oct. 1921.

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Pure water has a high order of resistivity with a negative coefficient of resistance, so that it is practicable to apply voltages up to 12,000 directly on the boiler. The economy of using the higher voltages without the necessity of step-down transformers is readily apparent, as usually transformers would cost more than the generator itself. Less copper is required also.

In most cases three-phase alternating current will be used. The economical arrangement of the generator will then be to use a single tank with three electrodes and a neutral on voltages up to about 2,200. The electrodes are connected directly to the line; the neutral point and the tank are grounded. For large units and voltages higher than 2,200, a three-tank arrangement is best. In this case, each tank has one electrode immersed in it and connected to the line; the three shells are connected together and grounded, thus forming the neutral point of the star connection.

Such are the fundamentals of the water resistance type of boiler. Outstanding features are its simplicity, compactness, easy control and low first cost, which is often the deciding factor, particularly for a temporary installation.

Economic Field of the Electric Steam Generator

The electric steam generator was developed in America to consume off-peak and surplus power of a large hydro-electric system. The first installation was made in a Canadian paper mill in a region where coal was costing about $8.50 a ton. This initial generator was designed to consume 15,000 k.w., but has since been run at 18,000 k.w. continuously, with a steam production of 55,800 pounds

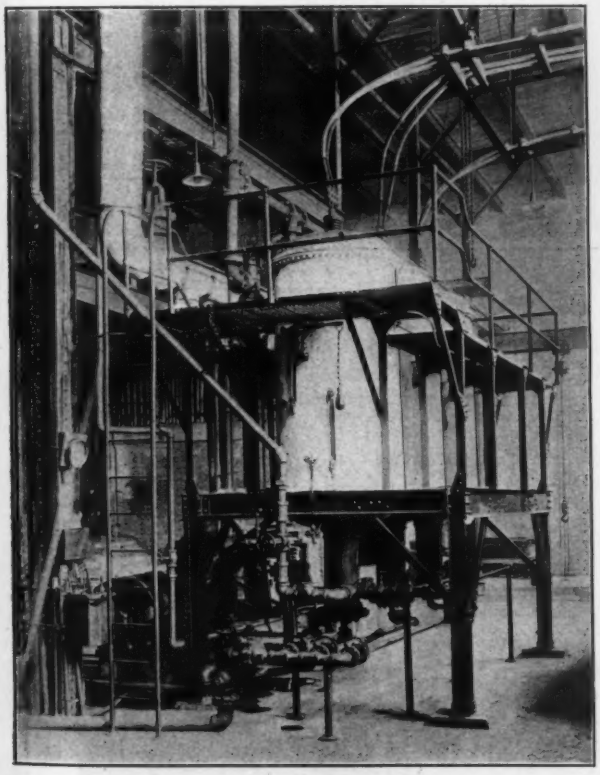

Fig. 1

Belgo-Canadian P. & P. Co., Shawinigan Falls, P. Q., normal power input 18,000 kw.. maximum, 22,000 kw., at 6,600 volts, 3 phase, working pressure 135 pounds. Floor space occupied approximately 12x25 ft.

per hour at 135 pounds pressure. Other installations have been made since then, until now the total capacity of this type installed or building is about 100,000 k.w. By far the greater number of these generators are found in the paper and pulp mills of New York and eastern Canada, where water-power has been quite widely developed and where coal costs are rather high. It is pertinent to the subject to examine the probable economic field for apparatus of this description, not of necessity confining the inquiry to the pulp and paper industries,—for the facts deduced should be universal in their application,—but surveying the field of steam users in general.

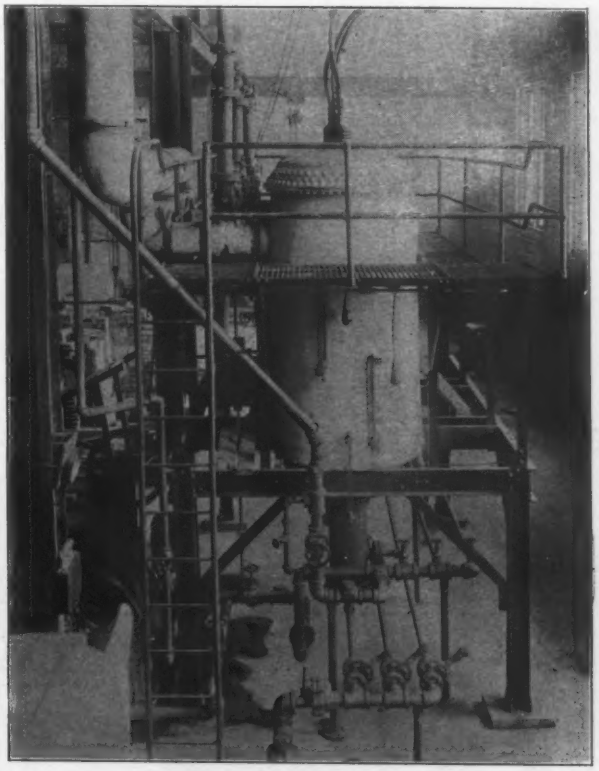

Fig. 1.—End View.

Three divisions of the economic field of the electric steam generator are suggested:

I. As a temporary consumer of firm power during periods of industrial slackness.

II. As an off-peak or surplus power load.

III. As a replacement of existing plant or as alternative when new plant is projected.

I. As a temporary consumer of firm power during the present period of subnormal business the electric steam generator has filled a genuine want. Large consumers of electric power, such as many paper mills, commonly buy blocks of power on a firm contract in amount necessary to cover their normal requirements. When the condition of business necessitates a reduced scale of operation a portion of this power is not being used, although paid for. Regardless of the costs of fuel and power, any device with reasonable first cost and low labor and maintenance charges, which will convert this power into steam and save the cost of an equivalent amount of coal, is bound to find a place for itself. Here it is not a question of the one method being cheaper than the other, but of saving good dollars that are being paid out for fuel when there is at hand a surplus of electric energy, paid for whether used or not, that can be used as a substitute for coal. Under these con-

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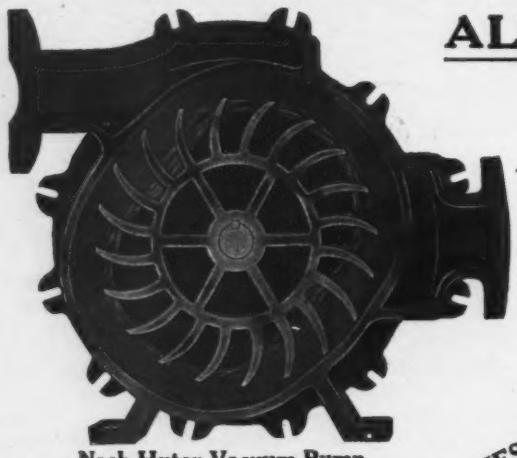

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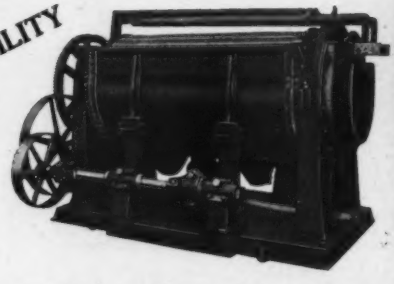

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ditions an electric steam generator will pay for itself in a short time and save money thereafter.

For example, assume coal costs $5 per ton and 50 tons are burned per day or a total cost for fuel only of $250 per day. An electric steam generator of equivalent capacity will consume approximately 10,000 k.w. and will cost about $15,000 installed. Saving $250 per day, it will take two months to pay for the installation of the generator, and if reduced labor costs were taken into consideration this showing would be even better.

II. As an off-peak, week-end, or surplus power load, the electric steam generator will find favor with power users and central stations. In general it might be stated that when the load factor of a system falls below 90 per cent there is a possible application. The importance of good load factor is widely recognized. By granting special rates for blocks of power during the night and at week-ends, central stations may utilize a greater percentage of their available capacity and secure additional revenue, while the customer may benefit by installing a steam generator to use this power.

An interesting project along these lines is being put forward. A consumer of power has a clause in his contract relating to demand which automatically establishes the demand at the higher figure when the stipulated figure in the contract is exceeded for a period of one minute or longer. To increase the load factor of the system, a steam generator will be installed to consume surplus power. To insure against exceeding the demand, a semi-automatic

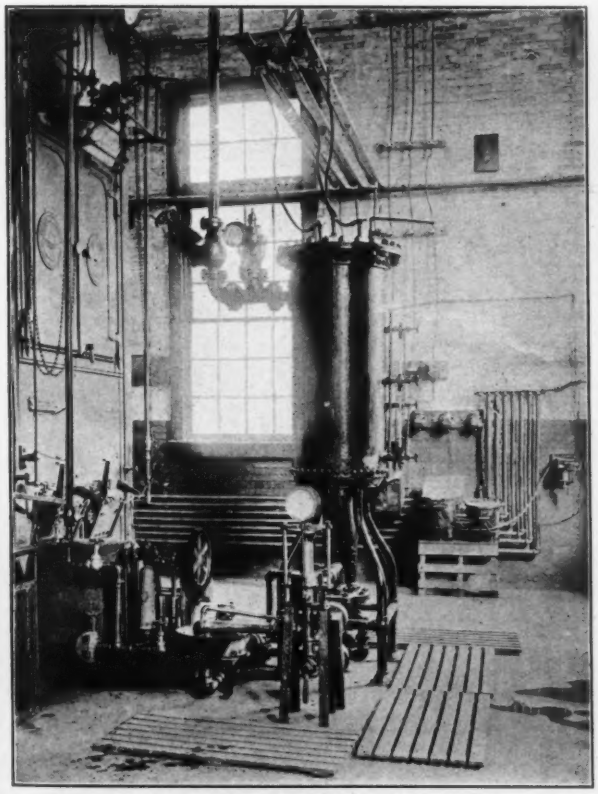

FIG. 2.

Wayagamac Pulp & Paper Co., Three Rivers, P. Q., 5,000 kw., 2,200 v. 3 phase, single tank. Working pressure 150 pounds. Floor space occupied about 6x12 ft.

control will be provided, which will increase or decrease the load on the generator according to the load demand of the system as a whole. The difference between the power paid for and the power consumed by the system other than the generator will represent the saving effected in the fuel bill for this plant.

As a surplus load, very much the same reasoninng may be applied as is given under heading I. An instance of this is a generator, 20,000 k.w. capacity, which was put down by a central station in a paper mill to consume surplus energy. Steam was sold at a saving to the customer amounting to 40 per cent of his costs with

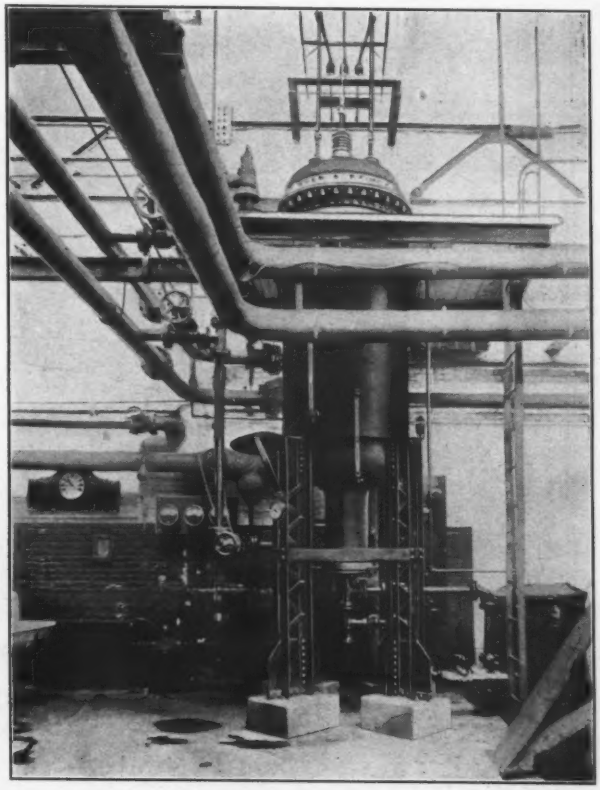

FIG. 3.

Canadian Electro Products Co., Shawinigan Falls, P. Q., 1,300 kw., 2,200 v., 3 phase, single tank. Working pressure 125 pounds. Floor space about 5x8 ft.

coal boilers; and the central station amortized the installation in eight weeks.

III. As a replacement of existing plant or as alternative when new plant is projected, the electric steam generator is to be considered only when fuel is expensive and electric power is abundant and cheap.

Under headings I. and II., the absolute relative costs of the two methods were not considered, but in this case they will be taken up. A comparison of a coal burning installation and electric steam generators of equivalent capacity for a typical paper mill will perhaps be the best method of bringing out the relative costs. The items to be considered may be tabulated and brief comment made before detailed figures are shown.

Operating Expenses

1. Cost of coal per ton or of power per e.h.p. year.
2. Labor.
3. Maintenance.

Fixed Charges

1. Interest on investment, depreciation, insurance and taxes.
5. Overhead.

1. Cost of coal will be taken f.o.b. the plant and an average boiler and furnace efficiency of 65 per cent assumed.

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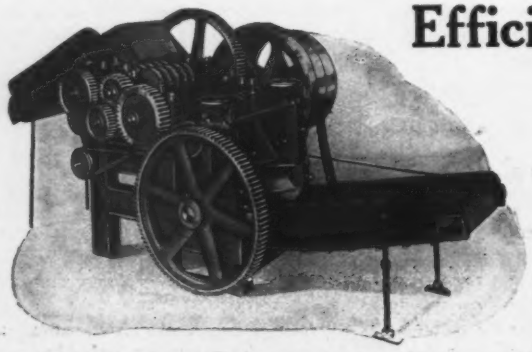

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Labor

2. The only labor required to operate the electric steam generator is an attendant to operate the bleed valve occasionally, to vary the feed input according to steam demand and maintain electricat balance on the line when three-phase multiple tank units are used. His duties are few. One man can attend to a single unit of any capacity or for plural installation up to 7,500 or 10,000 b.h.p. At one plant now being put down, where 50,000 k.w. or 5,000 b.h.p. in two three-phase, three tank generators will be used, the operation will be arranged for one man who will not need to stir from his chair but will have every instrument, switch and valve within easy reach. This lone attendant may be contrasted with the large squad necessary for the average boiler plant of like capacity.

3. The item of maintenance and supplies is trifling for the electric generator. The only parts of the apparatus subject to wear are the electrode, which may be replaced annually at nominal cost, and, of course, the valves, but these are to be considered in any case. Since the highest temperature is that of the steam, the troubles met with in flame-heated boilers are not encountered, such as burning out of refractories and falling arches, cleaning of flues, melting of grate bars, wearing of stoker parts or if coal handling equipment is used, repairs to this machinery.

4. Interest, depreciation, insurance and taxes will be combined and will be taken as 14 per cent for both types of apparatus. The original investment in apparatus and buildings will be very much lower for the electric generator than for the usual boiler plant. The size of building particularly will be small for the former. In a number of cases it will be possible to place the generator in a corner of the room where the steam-consuming apparatus is installed, doing away with long pipe lines and with the use of an extra attendant for operating the generator.

For a typical comparison we will consider a boiler plant consisting of eight 400 b.h.p. stoker-fired units, average boiler and furnace efficiency 65 per cent; and an electric steam generator of the same total capacity in 2 equal units. Both plants will operate three 8-hour shifts. Coal will cost $10 per ton f. o. b. the plant; electric power at $15 per e.h.p. year will be used.

I. Coal Fired Plant.

1. Fuel cost — 60,000 tons per year × $10 = $600,000.00.
2. Labor:***

No. of Men and Duties	Rate	Total Cost Per Day	
1 boiler house foreman on each shift..	.90	$21.60	
1 water tender each shift.....	.65	15.60	
1 foreman of coal handling.....	.65	5.85	
2 coal handlers on each shift.....	.55	26.40	
1 ash handler on each shift.....	.55	13.20	
3 firemen on each shift.....	.65	46.80	
2 helpers on each shift.....	.55	26.40	
Total per day		$155.85	
Yearly cost 365 × $155.85.....			$56,885.25
3. Maintenance			8,000.00

***Loren L. Hebberd, M. C., Technical Association Papers, Fourth Series.

4. Interest on investment, depreciation, insurance and taxes—

The total investment will run in the neighborhood of $250,000 made up as follows:

Building and stack.....	$50,000.00	
Boilers and auxiliaries @ $60.	192,000.00	
Coal trestle, etc.....	8,000.00	
	$250,000.00	
14 per cent of $250,000....		35,000.00
Total yearly charges.....		$699,885.25

II. Electric Steam Generator Plant.

1. Electric power at $15 per e.h.p. year.
One b.h.p. requires 13.4 e.h.p. 3200 x 13.4 x $15. $643,000.00
2. Labor:
1 attendant, 3 shifts @ 65c. yearly, 24 x .65 x 365.. 5,256.00
3. Maintenance 2,000.00
4. Interest, depreciation, taxes and insurance.
The total investment will amount to $53,000, made up as follows:

Steam generators, including feed pump, hot well and accessories..	$41,000.00	
Building	12,000.00	
Total investment	53,000.00	
14 per cent of $53,000.....		$7,420.00
Total yearly charge.....		$657,676.00

Summary:

Total yearly for coal plant.....	$699,885.25
Total yearly for electric plant.....	657,676.00
Saving yearly in favor of electric steam generator..	$42,219.25

Conclusions

The use of electricity will save the cost of the installation in a little over a year.

From the facts presented in the foregoing, we may briefly recapitulate and present conclusions.

The outstanding characteristics of the electric steam generator may be summed up:

1. This type of steam generating apparatus is the cheapest method of converting electric energy into heat.

2. For the power consumer the generator provides a means of utilizing idle power and thus improving the load factor.

3. The power company is able to sell its surplus power for the generation of steam. This is made possible mainly by the comparatively low first cost of the electric steam generator.

4. By the utilization of much idle power the conservation of our natural resources is furthered.

5. The generator may be installed in a very small space close to where steam is required. It is simple, reliable, easily controlled, safe in operation, and requires only the attention of an ordinary skilled man.

Report of the Heat, Light & Power Committee

Report to the Annual Meeting of the Technical Association by H. S. Taylor, Chairman

During the past year a number of subjects have been considered by your committee, and of the list considered three have been selected for this meeting, one Illumination, the second Economizers, and the third The Power Plant.

Illumination of the pulp and paper mill has so far had but little study, lighting being carried out to conform to general rules laid down by the underwriters, and I believe that a careful study of the requirements will provide the means for extensive improvements. Mr. Kurlander in his article selects certain methods and equipment for different parts of the mill, and recommends that certain fixed rules be followed.

Economizers in the paper mill power plant is a subject that always promotes an argument, one manufacturer stating that a saving is shown, while the other denies it. Mr. Derry has outlined

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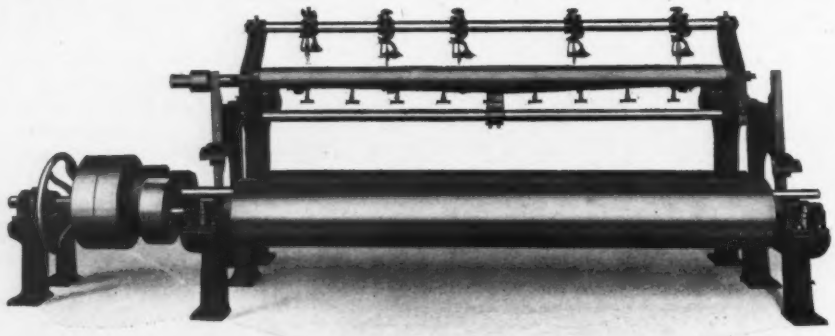

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his views in the following paper and I hope that its reading and the following discussion will clear up at least a few of the vital points.

The power plant is also a subject that is vital to the industry. Messrs. Rogers and Darling have recorded their experience and recommendations as to what the power plant should include and what it should do.

By coincidence, for it was not at all premeditated, the three subjects selected for this meeting are typical of your committee's classification, namely, heat, light and power. Light and heat must come from the power plant, and we therefore generally classify in our minds the three subjects under the word "Power."

Outside of raw materials power is one of the largest single items of expense in the manufacture of pulp and paper, and the average mill offers a most excellent opportunity to effect economies in the cost of power. These opportunities, however, in many instances are either neglected or totally disregarded, provided the supply is ample for the demand, and production is not interfered with. In other words power in the paper mill is a by-product, and is considered, I fear, too much as an aid to the manufacture and not as an absolute necessity, and a very expensive necessity at that.

From a power standpoint mills of the industry can be roughly divided into two classes, the first, those mills that require steam only for drying and heating, with also the demand for cooking provided a chemical pulp mill is a part of the installation, and second, those mills where the entire power demand is fulfilled through steam. While a steam boiler plant is common to both classes, equipment for the conversion of this steam into mechanical power is radically different, and the general characteristics are such that these two types of plant must be treated independently. For instance, in the first class all steam generated is or should be condensed in the process of pulp or paper making, therefore, there can be no consideration of condensing equipment. In the second class, however, condensing equipment plays a most important part, permitting the use of a much more varied line of prime movers.

The steam plant of the first class, while of greater capacity, is much simpler, but a general inspection will prove that in both classes there is an opportunity for a very marked improvement, although it is oftentimes difficult to convince the manufacturer of this fact, primarily, I believe, for the reason that pulp and paper is the reason for the plant's existence. For a confirmation of this statement inspect a power plant whose entire output is sold, its reason for existence being the sale of power, and then inspect a power plant for a large paper mill, the total capacity of which may be greater than the plant first mentioned. The difference in the equipment and the handling of the plant is so marked that it cannot be missed. The plant selling power will show accurate records for each pound of steam or kilowatt of electricity reduced to exact figures of cost, profit, etc., whereas the average paper mill power plant will show a set of figures that are rarely complete, and show the general indifference to facts other than a supply sufficient to meet all demands of the pulp or paper production is at hand.

Again inspect the plant selling power, and except for the general appearance there is no evidence of steam being generated, whereas an inspection of the roof of the average paper mill will prove that steam in a considerable quantity is being generated, this considerable quantity issuing from the numerous exhaust heads and other outlets installed to prevent this waste steam from wrecking the mill internally. It can be truthfully stated that there is absolutely no excuse for waste of steam, and where there is waste, a rearrangement of equipment or the addition of new equipment will place the power plant in the same position as that of the one selling power, namely, every pound of steam represents dollars invested, and a return on the investment is not forthcoming for any quantity passed to atmosphere.

Statistics for paper mill power plant operation are difficult to find. Those from power plants selling power are easy to secure, and with this condition it is difficult to compare the costs, but I do know that if the average paper mill power plant was given the attention both in equipment installed and in operation that is given to the average plant selling power, the return to the paper manufacturer would be beyond his expectations.

The study of the paper mill power plant must not be confined to the steam plant alone, but should be carried through to the final distribution, whether it be steam or electricity, as losses may occur at any point in the entire system, and from my own experience I fully believe that such a study in the average paper mill will lead the way to improvements and corrections that will place the power plant on par with the plant selling power, a condition that must be met in the demand for reduction in the cost of manufacturing.

Recovery and Its Control

Read at the Annual Meeting of the Technical Association by G. K. Spence

There are different methods for figuring recovery, but all have the same ultimate idea in view, which is to determine the percentage of the original soda used that is recovered and returned to the system.

It is generally customary to consider all soda used in the mill on a 48 per cent Na_2O basis. This custom became prevalent, due to the idea that recovered black ash from the rotary furnace contained 48 per cent Na_2O, while in reality this ash rarely contains over 46 per cent Na_2O. The average Na_2O content is more nearly 45 per cent.

In some mills the recovered black ash is weighed before sending it to the leachers, and the total weight multiplied by the average test gives the total ash recovered in 24 hours. The recovery is determined in this case by adding the amount of fresh 48 per cent soda used in the alkali room to the above total, dividing this new total into the amount of fresh 48 per cent soda used and multiplying by 100.

Regardless of the method used, it is customary to figure recovery from the amount of fresh soda used in the alkali room, without any reference to the change in the amount of soda in circulation in the different departments. This is a mistake, as the recovery figure in this case has no bearing on conditions in the soda mill at that particular time. One wishes to know at the time the cause for a poor recovery, and when handled in the manner above mentioned, the cause may come on one tour and the poor recovery not show up until the next tour, or even a day or two later.

Actual Recovery for Any One Tour

Some years ago the writer instituted, and has since been using the following system, which gives the actual recovery for any one tour, or any one day, if not found convenient to check conditions every tour:

It is more convenient to make the digesters the starting point, due to the fact that the digester liquor is always carefully measured and tested. The number of digesters put on, multiplied by the pounds of 48 per cent sola used in each digester, will give the total soda used on each tour, or each 24-hour run, as the case may be. A recovery inventory report is filled out at the close of each tour, and balanced in order to show gain or loss in the amount of soda in circulation in the various departments. From this data,

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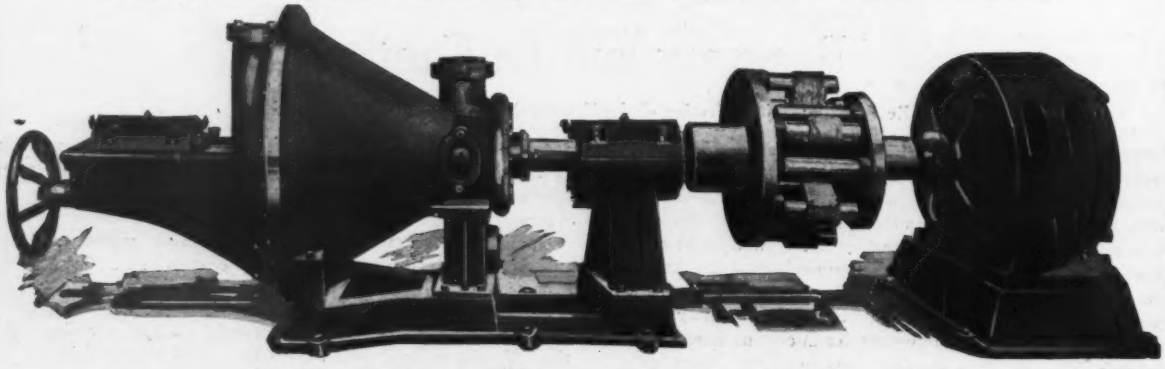

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the amount of fresh soda used in the alkali room, and the number of digesters put on, the actual recovery can be determined for any one tour or any one day. There are fixed figures for each inch gain or loss in the different liquor tanks, and for full digesters, strong alkali pans, strong wash pans, and full leachers in circulation. The following example, taken from two inventory reports, will better explain the method of procedure:

Recovery Inventory Report

11-7 Tour—March 5, 1922	Gain	Loss
Empty Digesters 1		
No. 1 Digester Tank .....Full		
No. 2 Digester Tank .....59" out		
Digesters Put On 15		
Strong B. S. Pans 3		
B. S. Storage Tank .....6" out		
Yaryan Storage Tank .....8½'		
B. S. Pans Run 14		
Rotary Tank .....29"		
Leachers Full 2		
Strong Alkali Pans 8½		
Caustic Liquor Tanks .....6" out		
Carbonate on Hand .....321"		
Alkali Pans Made 7		
Soda Used 7,700		

Leaks—Digester Pump—Called Pump Repairman.

—Signed.

7-3 Tour—March 6, 1922	Gain	Loss
Empty Digesters 0	4,000	....
No. 1 Digester Tank .....Full	....	....
No. 2 Digester Tank .....49" out	550	....
Digesters Put On 15	....	....
Strong B. S. Pans 2	....	4,000
B. S. Storage Tank .....8" out	....	300
Yaryan Storage Tank .....9'	600	....
B. S. Pans Run 15	....	....
Rotary Tank .....33"	1,680	....
Leachers Full 2	....	....
Strong Alkali Pans 8	....	5,500
Caustic Liquor Tanks .....8" out	....	1,200
Carbonate on Hand .....351"	....	....
	6,830	11,000
		6,830
		4,170

Alkali Pans Made 7
Soda Used 10"x110 Gal. x 1.75 lbs. 1,925
Carbonate Liquor Drawn .....40"
Leaks—None.
Actual Soda Lost = 4,170 plus 1,925 = 6,095 lbs.
15 Digesters x 4,000 = 60,000 lbs. soda used.
60,000—6,095 = 53,905 lbs. soda recovered.
Actual recovery = 89.84%.

JOHN DOE, Signed.

So much for the method of figuring actual recovery.

What Becomes of Extra Soda?

The question now arises: If the actual recovery is low, what became of the extra soda? In an efficient recovery control system it is not necessary for the man in charge to guess at the answer to this question. He has the proposition so well lined up that he can at once place his finger on the proper point in the recovery department, and arrange to stop the leak or reprimand the party responsible for the loss.

The thoroughness of the check system is dependent upon the class of labor employed in the various departments. In some mills the men are as much interested as the recovery foreman in saving soda in their respective departments. In this case it is not necessary to have the check system so rigid. On the other hand, there are times when the type of labor is so poor that they will cut corners when possible, regardless of the loss of soda by so doing. When one has this class of labor to deal with, it is advisable, wherever possible, to sew up the different departments in order to prevent strong liquor from being carelessly turned to the sewer.

Most Exposed Departments

The departments more exposed to chances for excessive waste are the brown stock wash pans and the alkali room. The writer has known of cases where a digester has been dumped into a wash pan and almost completely drained before it was discovered that the valve was opened to the creek instead of the strong liquor tank for the evaporators. Also of cases in the alkali room where a large quantity of carbonate liquor has been pumped to the creek before the discovery was made that the plug had not been placed in the wash-out line of the alkali pan before the leacher pump was started. These are cases of gross carelessness, due to conditions mentioned above, where the labor is not dependable. Excessive losses due to inefficient labor can be prevented in the brown stock department by introducing a cycle washing system and having no line that can be opened to the creek. In this case all washings either go to next succeeding pan or liquor storage tank for the evaporators. Large losses due to carelessness in the alkali room can be avoided by having the wash-out lines from the alakli pans connect with a pump to a filter press, all sludges washed on the press, and the washings returned to the alkali room for making up strong pans and first washes in this department.

Some form of filter press is in use in a number of soda pulp mills today, and the recovery in this department has been considerably improved by its addition.

We all know that the principle of recovering soda from spent liquor is theoretically perfect, but owing to leaks in the different departments, the best recovery obtained in the present day is 91 per cent, while the recovery in most mills falls considerably under this figure.

The secret of good recovery can be summed up in a few words—"Watch the leaks and do not allow soda to get away."

An Efficient Control System

The writer has found that the most efficient recovery results can be obtained by installing the following control system:

Place a boy on each tour, not necessarily a chemist, but a dependable high school boy, who can figure and learn to make certain routine tests. His duties are:

1. (a) If a filter press is in use, to test an average sample of lime cake from all presses dumped for soda content, and from the number of pans pumped and pounds of calcium carbonate in each pan, the loss of soda at this point can be readily calculated. (b) If filter press is not in use, to measure and test sample of each sludge washed to the sewer, in order to determine loss of soda in this department.
2. To check Beaumé and causticity tests of the digester liquor.
3. To test a sample of liquor from each wash pan when it is turned to the creek in order to check loss of soda in this department.
4. To check temperature and Beaumé tests of the weak and strong liquor at the evaporators. This record will give a check on the manner in which the stock was washed, and uniformity of the strong liquor sent to the evaporators.
5. To test water from condenser pumps of the evaporators from time to time to determine if any soda is being pulled over.
6. To test all leacher dumps in order to determine loss of soda at this point.
7. To follow all lines, pans, pumps, etc., for leaks, when possible fix them, or if necessary call out the proper repairman to do so.
8. To take an inventory of all soda in circulation at the close of each tour, and make out a report similar to ones shown in forms above.

What Efficient System Should Include

An efficient recovery system will include a venturimeter to measure all liquor pumped from the wash pans to the evaporators, which, when supplemented with an average test of the liquor, will give the pounds of soda delivered from the wash pans to the evaporators.

It is also advisable to make occasional tests of the rotary flue gas to determine the loss of soda up the stack. This latter test has been fully described by the writer in a paper presented to the Technical Association and published in *Paper*, February 12, 1919.

If a system similar to the one above described is employed by every soda pulp manufacturer, there will be no reason whatever for a poor recovery, as he will then be in a position to tell where the leaks occur and remedy the condition at once, whether it be due to carelessness of the employees, or the necessity of increasing the equipment in any department.

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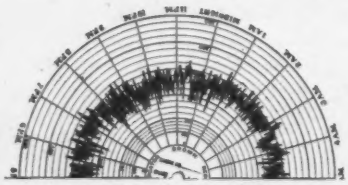


12-HOUR SPEED CHART
Before Installing Meyer Governor

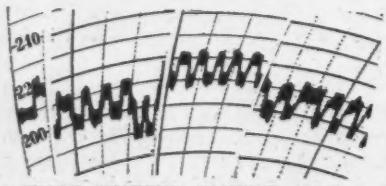
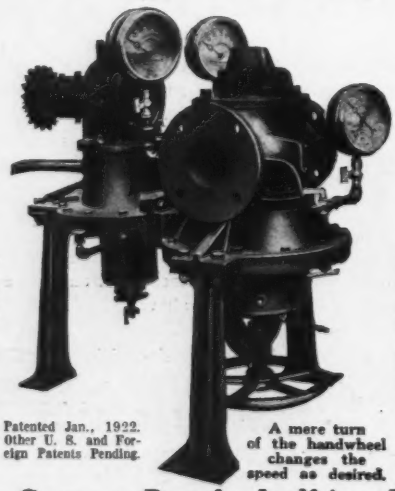


CHART SHOWING POSITIVE SPEED CONTROL DURING POWER TEST WITH MEYER GOVERNOR



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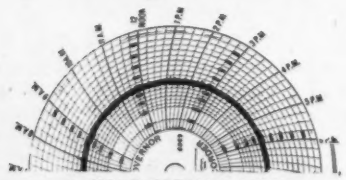
A mere turn of the handwheel changes the speed as desired.



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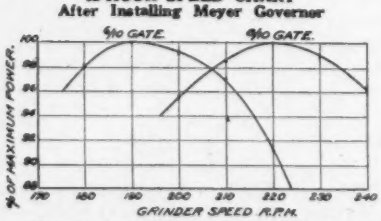

CHART SHOWING RELATION BETWEEN SPEED AND POWER DETERMINED WITH THE MEYER GOVERNOR.

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3. It practically eliminates grindstone breakage and the accompanying repair cost and loss of production.
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Relative Efficiency of the Automatic Magazine Grinder as Compared With the Pocket Type Grinder

Papers Read at the Annual Meeting of the Technical Association by John J. Case, Chief Engineer of the Baker Mfg. Co., Saratoga Springs, N. Y.

In the consideration of the subject of the economic efficiency of the two types of wood pulp grinders, the writer has endeavored to be as brief as possible. However, in order to make the subject plain to those interested, it has been necessary to make detailed explanations of some points for those who are not familiar with the construction and operation of the magazine type grinder.

By relative efficiency, we mean a comparison of the two types of machines with regard to results obtained by each type relative to costs of labor, power, and maintenance charges.

In comparison of either type of grinder we must consider, as a base from which to derive our results, an installation which is modern in every way; that is, the grinders in good condition, wheels developing their rated power, working conditions normal in respect to light, heat, ventilation and personnel, the last item having considerable bearing on the quantity and quality of pulp produced.

In order to avoid repetition and confusion, we will subdivide our comparison into separate items, each of which will be considered separately. These items will be as follows:

1—Construction and operation of:
- (a) Pocket type grinder.
- (b) Magazine type grinder.

2—Production.

3—Labor.
- (a) Labor costs.
- (b) Personnel.

4—Maintenance.

5—Installations.

6—General equipment.

Construction and Operation

(a) Most manufacturers are so familiar with the pocket type grinder that no description of its construction and operation are needed. However, we may emphasize that the duties of the grinder operator consist in filling the pockets in such a manner that the maximum amount of wood will be used, turning on the grinding pressure, reversing the press plate after the wood is ground and again refilling the empty pockets.

In many cases one man attends to two grinders, if they are of the small type. However, if maximum production is required and the machines have sufficient power delivered to them, one man is required to operate each grinder.

(b) The construction and operation of the magazine grinder is not generally understood by the manufacturers, therefore will require some details regarding it.

The automatic magazine grinder is a machine of considerable size, and its details of construction, especially of the automatic device for charging the pockets, are worthy of special consideration.

The grinder proper consists of a heavy central frame work in which the stone, 54" face x 62" to 67" in diameter is hung. On either side or diametrically opposite and formed by the side walls and bottom plates, are two pockets in which are placed two heavy press plates, one for each pocket, which push the wood against the face of the stone. These press plates are operated toward and away from the face of the stone by means of heavily constructed hydraulic cylinders and pistons, and in a manner similar to the raising and lowering of the press plates in the pocket type grinder.

Immediately above the pockets on either side of the stone are the magazines for storing the wood to be ground. These magazines are tall box-like affairs of plate steel construction, 54" wide x 60" long and from 16 to 25 ft. in height. Being of plate construction and when fitted with an exhaust hood on top, they are able to use the steam generated by the grinding process to partially steam the wood stored in the magazine and at the same time remove this steam from the grinder room. These magazines are placed on hinges secured to the floor above the grinding room, so that they may be swung aside when the stone needs to be removed.

Between the magazines and on the upper side of the center frames is a stone dresser, operated by means of hydraulic pressure through a cylinder and piston. The motion of the carriage which holds the burr and its adjusting arrangement, is propelled backward and forward across the face of the stone by the operator through the manipulation of a simple plug valve.

Close to each hydraulic cylinder and connecting to the valve which governs the pressures admitted to the hydraulic cylinders, are the automatic reversing devices which in turn operate the pressure regulating valve.

In regard to the operation of these machines, there is, first, the operating or grinding floor, where one man is required to dress the stones, oil the machinery and observe its operation; and second, the charging floor, where the magazines are filled. Wood can be brought into this room by conveyor and dumped into the magazine, or it can be carried by overhead trolley and cradle and placed directly in the magazines.

In either instance a man is required to see that the wood does not fall crossways or become wedged.

The man on the grinding floor will be able to attend to four grinders without any trouble whatever, while one man to two grinders on the charging floor would be a good average. This is the full extent to which labor enters into the operation of the magazine grinder, as the charging and reversing of the pockets and pressure governing is taken care of by the automatic reversing devices.

Production—Power Requirement

In regard to power per ton of pulp produced, it is a well established fact that a certain pressure in pounds per square inch area of the grinding surface of the stone is positively required to make groundwood pulp. This pressure varies with the grade of pulp being made and the type of burr or stone dresser used.

With the above conditions being considered as constant for a given grade of pulp, there are, in addition, a number of other factors which must be taken into consideration when computing the horsepower required per ton of pulp. These items are, (a) condition of wood to be ground, (b) friction load on grinder bearings, (c) efficiency of power unit, (d) peripheral speed of stone.

Averaging the above conditions and quality of pulps, we find that an average of 65 horsepower per ton will be required to grind one ton of pulp under normal conditions. Any method which will assist in the partial elimination of any of the varying conditions stated above, will of course tend to reduce the power consumed.

In the pocket type grinder the bearings have to carry the dead weight of the stone, flanges and shaft, and, in addition to this, they have also to support the resultant pressure or load resulting from the grinding pressure in the hydraulic cylinders. The net result is that the friction on the bearings is high and needs considerable power to overcome it.

In the case of the magazine grinder, the pockets are situated 180 degrees apart and have a tendency to counterbalance the weight of the stone, flanges and shaft, with the result that the bearing

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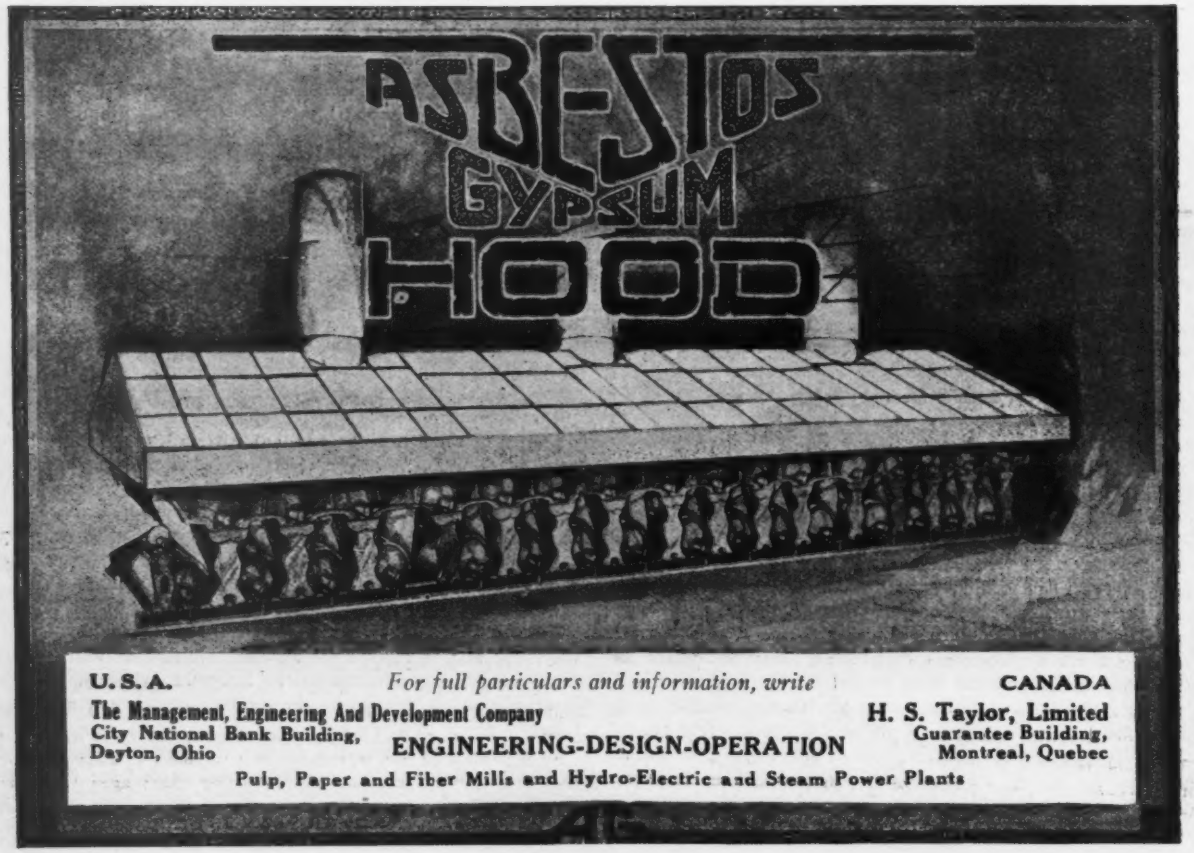

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friction is low. A real proof of this is found in Mr. Argy's recent address at the superintendents' meeting at Watertown, N. Y., wherein he states that the magazine grinders installed at the mill of the Cliff Paper Co., Niagara Falls, in 1913, are yet running in their original bearings, the oil grooves of which have never been chipped out and are yet deep enough to give a sufficient supply of oil to the bearings.

Another condition which helps to produce maximum tonnage per horsepower is the elimination of lost time in charging the grinder pockets.

In the use of the automatic reversing devices on the magazine grinder, we have a cycle of operations based on an interval of five minutes' time. This cycle and its time requirements are as follows: Considering the press plate at the end of its grinding stroke, where it operates a trip for reversing, we have:

(a) Reversing of press plate—5 seconds.

(b) Pause to let wood fall into place—5 seconds.

(c) Low pressure advance—to pack wood tightly in front of plate—5 seconds.

(d) Grinding stroke, high pressure—4 minutes 45 seconds.

This gives an actual loss of grinding time of 3 minutes per hour, or 5 per cent of total grinding time.

In the pocket type grinder we find the loss of grinding time in filling the pockets to be considerably greater, due to the fact that considerable time is lost in sorting the wood to get a full pocket, and even then the pocket is not often more than 75 per cent filled.

Another item greatly affecting production is effective grinding surface of the stone, or area exposed by the pockets for grinding. In the 3 pocket 24″ grinder, this area is: $15'' \times 24'' \times 3 = 1{,}080$ square inches.

In the 4 pocket 24″ grinder, this area is: $15'' \times 24'' \times 4 = 1{,}440$ square inches.

In the magazine grinder, the grinding area is: $48'' \times 32'' \times 2 = 3{,}072$ square inches.

This gives us nearly 300 per cent more grinding area as compared with the 3 pocket 24″ grinder, and nearly 225 per cent more area than in the 4 pocket 24″ grinder.

Another advantage of the magazine grinder is the partial steaming of the wood in the magazine before grinding, as this aids materially in production by loosening the fibre to a considerable extent from the pitch and binder which holds it. As the grinding process consists in the loosening of the wood fibre, partly by the heat generated by the stone and partly by the cutting effect of the grains of quartz composing the stone, any process which assists in either direction assists in the other. In many instances it has been found to be an added advantage to steam the wood before grinding it, but the use of the magazine gives this added advantage without additional expense.

While the above cited conditions do not actually reduce the power required to operate the grinder, they do reduce the horsepower consumed per ton by using all of the available power for production, due to small loss of grinding time and increased grinding surface. Actual results obtained from users of this type of grinder show power requirements of from 54 h.p. to 70 h.p. per ton, depending on the grade of pulp ground.

3—Labor

The third item for consideration is labor, subdivided into labor costs and personnel.

(a) Labor costs or charges can best be shown by a simple comparison of a mill, for example, of 40 tons capacity per 24 hours.

With the pocket type grinder there would be required at least four, probably five, four pocket 24″ grinders. The labor required for such a mill would be:

4—men to operate grinders.
2—men to deliver wood to operators and handy men.
1—man oiler and helper, also to re-saw to 2-foot lengths.
1—foreman.

Total 8—men per tour for 3 tours — 24 hrs. = 192 hrs. at an average wage of 50 cents per hr. = $96.

$$\frac{\$96}{40 \text{ tons}} = \$2.40 \text{ labor cost per ton.}$$

Using the magazine grinder for the same size of mill would require two grinders of twenty tons minimum capacity. The labor requirement would be:

1—man on grinding floor who would act as foreman.
1—man for oiling for 3-8 hr. tours, and helper for 2-10 hr. tours.
1—man on charging floor for 2-10 hr. tours.

Total 3—men for 64 hrs. at an average wage of 50 cents per hr. = $32.

$$\frac{\$32}{40 \text{ tons}} = 80 \text{ cents labor cost per ton.}$$

Cost per ton pocket type grinder	$2.40
Cost per ton magazine type grinder	.80
Difference in cost per ton	1.60

As the size or tonnage of the mill increased, the labor cost shows up to still greater advantage in favor of the magazine type grinder.

(b) In regard to personnel, there are a number of items which may seem a little out of place in this subject. However, they have a direct bearing on the efficiency of operation of any plant of this kind.

A man who really understands pulp grinding should deserve favorable notice. It requires considerable experience and observation on the part of the operator to know what grade of pulp he is producing and how to quickly remedy such faults as occur daily.

As a rule the grinder tender has a job which is not incentive to much effort on his part except to get away as soon as possible after his time is up for the day. Usually the grinder room is wet, slippery and full of steam and the job of feeding the grinder is about as monotonous as can be found. Such conditions are favorable to rapid turnover of employees which is always costly, as inexperienced men cannot get results.

Another item is the tendency of average labor to let the pockets run empty, half fill them, quit work at the slightest provocation and in general let things slide as easily as possible.

The use of the magazine grinder eliminates all such conditions, as the grinder room is clean, dry, well lighted and free from steam and can be well heated and ventilated.

The operator on the grinding floor should be a first class mechanic who understands pulp grinding thoroughly, for the entire production of the grinders is up to him. The men on the charging floor need only be common labor, as no skill whatever is needed in their line.

The magazine grinder runs 24 hours a day, with no arguments and no strikes and the men required to tend it have plenty of time to do their work thoroughly. As a rule the operators of these machines take great pride in them, as the machine itself is incentive of good workmanship and neatness.

In regard to maintenance, the construction of the magazine grinder is of necessity unusually heavy to withstand sudden heavy loads such as, for instance, when a log rolls or a stick breaks or crushes. As a result of this heavy design, the necessity for repairs and replacements is reduced to a minimum. Parts that are subject to unusual wear such as adjusting plates against the face of the stone, are made of cast steel and are quickly and easily

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renewed at small expense. The press plates which hold the wood against the stone are also fitted with easily renewable bronze wearing strips.

Of course the steel shaft and stone flanges are subject to corrosion, but on account of their great bulk and their design they are easily able to withstand from eight to ten years' use before being replaced.

Considering the almost constant operation of these machines the cost of repairs is unusually low, a good average being one per cent of the cost of the machine.

The stones used for these machines are of course of unusually large size, but with proper seasoning and correct treatment they will last from 15 months to 18 months.

Installations of the two types of grinders are similar in that they may be direct connected either to water wheels or electric motors. The auxiliary requirements, that is, double pressure pumps, electrical or speed governors, showers, etc., are practically the same except of course on a larger scale.

With a capacity above 40 tons daily production, there is considerable saving in floor space and foundation work of the magazine grinder over the pocket type.

Economical Advantages

From the above comparison, it will be seen that the economical advantages to be derived by the operation of the automatic magazine type grinder when compared with the pocket type grinder can be totaled up as follows:

(a) Maximum production per horsepower consumed.
(b) Lower labor cost per ton of pulp.
(c) Partial steaming of wood at no additional expense.
(d) Low cost of maintenance and repairs.
(e) Use of 4 ft. wood eliminating at least one re-sawing operation.
(f) Cleanliness of grinder room.
(g) Elimination of considerable labor difficulties.
(h) Use of wood up to 30" diameter.
(i) Saving in floor area and foundation work.

Stamso—Cotton Linter Pulp

Read at the Annual Meeting of the Technical Association by Stewart E. Seaman, the Stamsocott Co., Hopewell, Va.

Mr. President, and Gentlemen of the Technical Association of the Pulp and Paper Industry, I greatly appreciate the opportunity to present to you the subject of "Cotton Linter Pulp." You are probably all acquainted with this new product. Much of this information was presented during January, before the Holyoke section of this Association, but I have added to that paper.

I shall begin with the source of the raw material. As cotton grows in the field and is plucked, more than 50 per cent of the product by weight is cotton seed. The balance is long staple cotton, which is removed at the cotton gin and is baled, going to the cotton market. The seed which has been removed by the ginning process, goes to the cotton oil industry. There are nearly 1,000 cotton oil mills scattered throughout the South. The cotton linters, therefore, are produced at the cotton oil mills.

What Cotton Linters Are

In order that you may understand what cotton linters are, probably an explanation of how they are made is in order. The woolly, white seeds, which are about the size of navy beans, are placed in storage at the oil mills, and are received during the cotton ginning season.

The first process in working up the seed is to clean it, which is accomplished in large, revolving drums, during which process sand, stems, bolls, etc., are removed. The cleaned seed then goes to the linter machines, which consist of a series of small, circular saws about 14" in diameter and spaced about ¾" apart. These saws revolve rapidly and the seed, after passing over a magnetic separator, passes the saws, and in doing so the lint is torn off the seed. By adjusting the saws, any quantity that is desired can be torn from the seed. After coming from the linter machines, it is baled, and it is this product which is shipped to our plant at Hopewell and used by us as raw material.

There is by weight 10 per cent fiber cotton adhering to the cotton seed, or about 200 pounds to the ton. The normal crush of cotton seed is about four and one-half million tons per year. As 10 per cent of this is cotton, we would have 450,000 tons of cotton, providing all was removed.

The normal demand for linters is 500,000 bales, or about 125,000 tons, which, subtracted from the above, would leave 325,000 tons. Forty pounds, or one-fifth, would probably be left on the hulls, which would reduce the above by 90,000 tons, making 235,000 tons available, which would probably go to the paper trade.

Based on 300 days, this would yield about 800 tons per day, in addition to supplying the normal linter demand. You can, therefore, see that there is a great amount of raw lint available for the paper industry after the market for linter pulp has become established and all of the oil mills are equipped to remove the available lint from the seed.

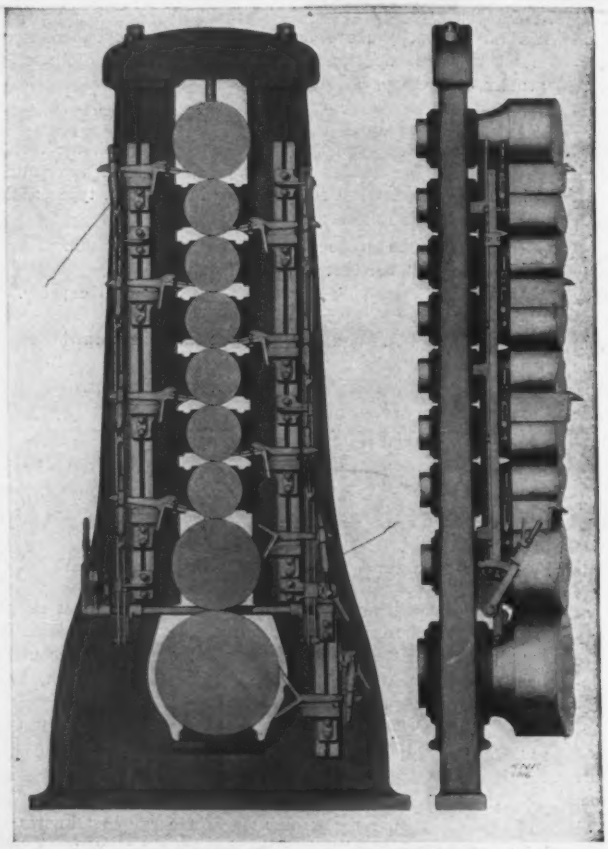
The product removed from the seed has been commercially known as "linters." Linter pulp is established under the classification of "Cotton Seed Hull Shaving Pulp," which is actually the correct term to use in connection with this product. I have used "linters" and continue to use the term, as it is the one best known to the trade, but I wish to explain this classification to you. A first cut lint from the cotton seed is truly a "linter." Anything removed after that is a cheaper product and is really a "shaving" from the seed. The second or third cut lint or the hull fiber is, therefore, a cotton seed hull shaving, and the pulp therefrom is "cotton seed hull shaving pulp."

Many Grades and Qualities

As you can appreciate, there are many grades and qualities of linters. As mentioned above, there is 10 per cent by weight of lint on the seed, or 200 lbs. to the ton. Many mills take off what is known as "spinnable" lint, which represents 20 lbs. of this 200 lbs., after which they remove another 40 or 50 lbs., as a second cut, which is known as "mattress" lint. Some mills take off 40 to 90 lbs. in one cut, and sell this product as a mattress lint.

The depth of the cut of linters determines the length and quality of the fiber. It is practicable for us to use as deep a cut as is economical for the oil mills to make, which total would probably not exceed 160 lbs. The remaining 40 lbs., which is still available, would probably better remain on the seed, as some of the other cotton oil products, viz., the meal-cake, would be affected if all of the fiber were removed from the seed. This 40 lbs., after the seed is crushed, would remain on the shell, which is then known as the "hull." The fiber adhering to the hulls can be removed by several methods.

The grinding method is the one usually adopted, wherein the hulls are ground and the small pieces of hull, or shell, are sifted away from the fiber, through screens. The resulting fiber is then known as "hull fiber," and, of course, is largely contaminated with hulls, and the fiber itself has been somewhat shortened by the grinding process. The presence of the hulls requires more drastic treatment for cooking and bleaching than do the linters.



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Influences of the War

During the war, there was a great shortage of cotton, and the only added source known was that which adhered to the seed. The Government, therefore, insisted that for every ton of seed crushed at least 145 lbs. of lint must be removed. Therefore, the various oil mills were forced to equip themselves with machinery sufficient to strip up to this amount.

The East St. Louis Oil Company and the Procter & Gamble Company went further, and made large installations for grinding the hulls to make hull fiber, thereby obtaining all the cotton available. All of this cotton was used to make "gun-cotton," and the various linter-using industries were forced to do without until the war ended.

At the conclusion of the war, therefore, there was considerable machinery for producing these short-fiber cotton products, and the demand had dropped to practically zero. There was, further, the equipment available as discarded war machinery for purifying and bleaching cotton for gun cotton.

The company I represent, the Stamsocott Company, was formed for the sole purpose of utilizing the short fiber cotton, and finding a permanent outlet for it. Arrangements were made with the du Pont Company to take over its plant at Hopewell.

The owners of the Stamsocott Company consist of a group of the largest cotton oil mills in the country, which crush approximately one-fourth of all the cotton seed produced in this country.

How the Raw Lint Is Treated

The raw lint arrives in cars at our plant in 500-lb. bales. It is carefully weighed, the bale-ties and burlap are removed, and it is then fed into special opening machines, which tear the cotton apart thoroughly. Some bales are tightly compressed, which largely magnifies this problem. After being opened, the lint is further beaten and fed through special machines, which we have designed for cleaning the fiber. It is then picked up by a fan and blown directly into our digesters. Caustic liquors are added, and when the digester has been charged, the top is put on and the cooking proceeded with under a high pressure, for the purpose of eliminating the ligno cellulose, fats, oils, waxes, etc.

After the cooking operation, the stock is blown into washing tubs to remove the cooking liquor, after which it is dropped to bleach tubs, where it is bleached with calcium hypochlorite and given its final color with dilute sulphuric acid. The stock is then further washed and pumped over riffle troughs to our dryers.

We do not have the usual dryers employed at pulp mills, but have one especially designed for our purpose. You will probably be interested in some of the details of this dryer, as it will explain the reason for the condition of the fibers when received by you. The pulp flows to a lattice apron, where the surplus water drains away, and the wet stock is fed to a squeeze roll. Here it is pressed to 50 per cent moisture and does not form in a sheet, but comes through in numerous small bunches. These wads are conveyed by another lattice conveyor to what is known as a "picker." This consists of a revolving drum about 30 inches in diameter, covered with numerous small spikes. The wads are here torn apart into small bunches and are thrown on a distributing apron, which carries the stock to a wire apron, which is in the dryer proper. This apron is about eight feet wide and on eighty-foot centers, and is completely housed in a steel chamber, on one side of which there is a row of steam coils. A fan causes air to circulate through these coils over the top of the wet cotton, down through the wire screen conveyor and back to the coils again. In this method the cotton is dried, as it passes slowly through the dryer and does not come in contact with any hot steam surface, being dried solely by the circulation of hot air.

The stock falls continually from the end of the dryer into a galvanized iron funnel-shaped hopper, from which it is picked up by a fan and blown through further cleaning machines, after which it goes to the storage bins. These bins are lined with galvanized iron and every precaution is taken throughout our plant to prevent contamination with dirt. The stock is forked from these bins to our bale press.

Here again, we had to design special equipment to handle our stock, and we now use a press that makes a bale without the necessity of bale blocks, the former use of which caused considerable trouble, due to the bale blocks breaking and contaminating our pulp with wood. A density of from 30 to 40 lbs. per cubic foot can be maintained in this press. When the proper length of bale has been obtained a pointed bar cuts off the bale, which is then bound with three strands of galvanized iron wire, after which the package is wrapped with a heavy kraft wrapper.

Tested for Color, Moisture and Dirt

As the stock goes to the bale press, samples are taken from every bale and tested for color, moisture and dirt count. There is one man on each shift at our plant whose sole duty is to make these tests. He, in turn, is checked by our laboratory. Each bale made is given a number tag with a duplicate stub on it. The weights of the bale are marked by the scale man. The man making the tests then grades each bale, and a record is kept at our plant of every bale made. We can, therefore, check back at any time on any shipment, providing our customers will notify us of the tag number of any bale made. The stock is then loaded in cars, which have been carefully swept out and lined with a car liner. Careful attention is paid to placing the seams on the bales in such a manner that car dirt cannot sift into the packages.

You will gather from the above that we have taken great pains throughout our process to remove any dirt from the raw lint to keep our stock clean, and that, further, we keep a record of every bale made.

Several Qualities of Pulp

We have several qualities of pulp which we make for special purposes. Our regular product is tagged under the grade "STAMSO AA." Some mills desire a semi-beaten stock, which is made the same as our AA grade, but is passed through jordans. The jordan treatment does not shorten the stock, but brushes it out, straightens and individualizes the fibers and hardens the stock quite a little. This semi-beaten product is sold under the grade "STAMSO J." For special purposes, we pass our "AA" grade through dusting machines, which remove considerable short fiber, leaving a somewhat longer-fibered product to pass out the end of the screen. This we term "STAMSO L." The short fiber product, which passes through the screens, is graded "STAMSO S." Several mills, and particularly production mills, have experienced trouble in screening our "AA" grade, but all have had success with "J" grade.

Both "AA" and "J" grades have been used in grades of paper where a rag content is desired. Apparently the same quality of paper can be obtained from either grade. The "L" product has been made especially for celluloid, and we have a few customers who use this in paper, for they deem it somewhat cleaner than the "AA" grade, which you can appreciate, as the dusting treatment eliminates some fine dirt, together with the short fiber. The short fiber product should be particularly adapted to book paper and papeteries.

It is somewhat difficult for me to attempt to discuss the manufacture of "STAMSO" pulp into paper with you, gentlemen, who are all experts in paper making, but you will probably be interested in having me relate some of the findings in the use of our stock.

There is on exhibition here a complete line of papers under our watermark which were made by the Collins Manufacturing Company, of Holyoke, who are the first company that was willing to make a special campaign for business on linter paper and to admit the amount of our pulp in the paper they made. As you are all aware, the Collins Manufacturing Company only makes the highest grades of paper and all of which are loft-dried.

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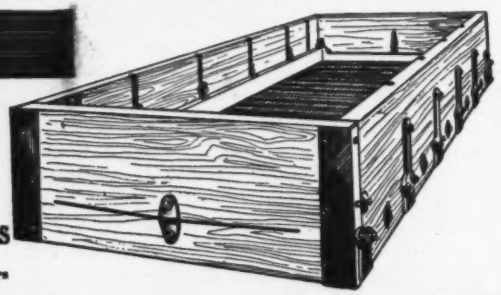

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Stock Widely Used by Paper Companies

Practically every high-grade company in the country is now using our stock in some percentage, but it has not yet been their policy to reveal the amount contained. You will further note that these sheets are all very high grade, and that the objections raised against the use of lint by numerous companies have been overcome in the making of this paper.

I cannot tell you how the particular sheets on exhibition were made, but I shall try to explain how the different mills handle our stock. It is thrown either directly into the beater with the balance of the furnish, or first into a separate washer. When thrown into the beater, "STAMSO" pulp is inserted first, as the stock requires lots of hard beating. When handled in this manner we would expect the greatest economy, as rehandling would be eliminated. Some mills, however, have found it to their advantage to treat in a washer first.

There is one mill, who make all high-grade papers, who throw our stock directly into the beater, beating four to five hours, and do not give any preliminary washing steps except in their "weddings." They claim they do not have any trouble with this time of beating in obtaining the necessary pop tests and other properties of the sheet. The reason for placing the stock in the washer is that they have a fine, bright water, which further brightens our stock, and then by the use of a small amount of additional bleach, the color is improved.

Other mills handling our stock in about the same manner, average about six to seven hours' beating time. Some mills prefer to place our stock in a washer, where they keep it for about three hours with about 1,000 lbs. in a 1,200-lb. washer. The roll is set down almost immediately to the desired brush, and just before dropping, a small amount of bleach is sometimes added. The color, however, cannot be improved by this treatment unless a brighter water can be had at the paper mill than we use at our plant. (We stop manufacturing after our water exceeds five on the usual water scale.) The stock is then dropped to the drainer and handled the same as the regular half-stock.

The object of our "J" grade was to eliminate the necessity of this washing step and to save you the added cost, at the same time to help those mills who thought linters too free and where they had encountered screening difficulties. We know one mill that makes a book paper, giving our "J" grade but two and one-half hours' beating, and uses 25 per cent in its furnish for the regular content. They do not experience any screening or other difficulties

Some mills declare they would prefer to beat their own stock, and where they have ample washing and beater capacity, can probably obtain the best results by so doing.

You must all bear in mind that linters represent a new, unused, unworked, cotton fiber, which requires practically a new rag-beating time. Many paper makers have looked at our raw material and because they have seen considerable short fiber, they thought that linters were soft and would not require much beating, which is not correct. There is considerable long fiber in our pulp, and I believe that most of the difficulties encountered in handling lint has been due to not realizing the last mentioned points.

Many Difficulties Overcome

As you are all aware, in developing a new product like this, many difficulties are encountered that must be overcome. As they have been encountered, steps have been taken to eliminate them, and I feel quite sure linters repersent the most uniform and the cleanest source of raw material for paper making that can be had. You all know the difficulties you experience in handling rags. Your magnetic separators will not pick out zinc buttons, rubber will escape the most careful inspection, burnt fiber is not eliminated and will show up in black specks, and particularly during the past several years permanent dyes have been encountered that cannot be successfully or uniformly bleached.

Linters will give a rag content with direct proportion to the amount used. Where thrown directly into the beater, the only loss in lint is in the tare of the package, which does not exceed 1½ per cent.

For permanent records, linters are most desirable, for they represent the maximum of true cellulose. "STAMSO" pulp is from 98½ to 99 per cent alpha cellulose. New rags approach this figure, but contain certain foreign materials, like starch, clay and other fillers. Old rags contain a maximum of 85 per cent alpha cellulose. The best sulphite pulp does not run higher than 89 per cent alpha cellulose. It is because of this predominating alpha cellulose content that linters will make the best record paper.

It has been found that linters will fold with the best quality of new rag. The pop test, however, falls somewhat short of the higher grade new rags, but the equivalent of the fancy shirts can be obtained.

As lint is a new cotton fiber that has not been worked or processed, it is not quite as compact and therefore gives somewhat more bulk to paper for the same unit of weight. Those companies that have been using "STAMSO" pulp can all testify to the added bulk obtained.

Cheaper Than Old Rags

You can use "STAMSO" pulp to advantage in place of old rags at a saving over today's price of rags. The color is also much brighter than can be obtained from old rags. You can also use it in place of new rags in various proportions. I believe that 25 per cent can be substituted for new rags without your noticing any difference in high test papers, and that you can save from five to ten cents per pound over the cost of new rag half-stock, which should prove quite an item today. In "weddings" and papers of that description, you can use 100 per cent "STAMSO" pulp in place of new rags at a very material saving. You will further get a greater bulk than you could from new rags. I do not claim you can get a pop test with "STAMSO" pulp equal to a high-grade new rag, but I do claim you can get all the rest of the properties, including folding tests, and by substituting some "STAMSO" pulp for new rag, you will free your stock appreciably and increase your production.

Future Demand

The advent of this stock should supply the need of additional cotton for paper making. You are aware that during the Civil War even news print was made entirely of rag, but as the demand for paper increased, it far surpassed the supply of rags. Linter pulp, therefore, should not displace other paper making materials, but add to them and furnish a uniform source of supply in large quantity, and in many mills eliminate the objectionable dirt and filth of the rag room.

GINJIRO FUJIHARA RETURNS TO JAPAN

Ginjiro Fujihara, president of the Oji Paper Manufacturing Company, Ltd., Tokyo, Japan, accompanied by his secretary, Y. Fukukita, returned to New York March 24 from an extended visit to Europe.

While abroad Mr. Fujihara visited a number of paper mills in England, France, Belgium, Germany and Sweden, and upon his return to this country he spent a week visiting several paper mills in the vicinity of Glens Falls.

Mr. Fujihara left New York on April 1 for Japan via Montreal. His party is booked to sail on the S. S. Empress of Asia from Vancouver on April 20, and while en route to the Pacific Coast will visit a number of Canadian mills.

Mr. Fujihara was agreeably surprised by business conditions in this country, especially by the activity of the news print mills.

Mr. Fujihara deeply appreciates the kindness and innumerable courtesies extended to him and his associates by his many kind friends in the various mills he visited.

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Report of the Sulphite Pulp Committee

Report to Annual Meeting of the Technical Association by W. E. Byron Baker, Chairman

Your committee on sulphite pulp submits the following report for the past year, with the hope that it will meet with your approval.

During the period just ended the work of the committee has been somewhat restricted, due to the fact that it was hoped we could meet together at the fall meeting and get committee matters in such a form by personal contact that rapid progress could be made. The failure to hold a fall meeting made the carrying out of these plans impossible.

Recent Work of the Committee

During the past few months the committee has been working in connection with the Bureau of Standards on recommended specifications for lime and limestone for use in the manufacture of sulphite pulp. This work has been completed, and copies of the report prepared for this meeting. Any discussion of these recommendations may be taken up at the symposium on sulphite pulp.

Two of the members of the committee will also present papers at this meeting. A. D. Wood will read a paper on "A New Idea in Chip Breaking" and George Barsky will read a paper on "Sulphur in Sulphite Waste Liquor." We feel sure that both of these papers will be listened to with interest and with profit.

As a part of the committee program there will also be presented a paper on "The Testing of Reclaimed Sulphite Acid," by Gösta P. Genberg, chemist of the Nekoosa-Edwards Paper Company. The committee hereby expresses its thanks to Mr. Genberg for this contribution, which will be read and discussed. Since this will give rise to a discussion of sulphite liquor testing methods, we are also publishing a contribution from Dr. Rudolf Sieber, on the "Analysis of Raw Sulphite Liquor." Dr. Sieber forwarded this to the chairman and gave permission for its publication, since the last meeting.

The sulphite pulp committee expected to send out a questionnaire along the lines suggested at the last meeting, but this for several reasons did not meet with the approval of all concerned, the chief objections being that it was too exhaustive, and probably would not meet with favorable acceptance on that account. It was thought preferable, if it is the intention to send out any questionnaires, to have them cover a phase at a time. A great deal of work is entailed in tabulating the data obtained, and if the committee can meet only once a year, and then only for a day, the result is that progress is very slow indeed, and even under those conditions nearly all the work must of necessity fall to the chairman alone. It is very difficult to obtain proper team work on a committee when only one meeting per year is held. Much of this work cannot be accomplished satisfactorily, even by endless correspondence. It is very desirable that the subject of a questionnaire be thoroughly discussed at this meeting. If a sufficient number pledge their response, the work will be undertaken.

Investigation of Lignin

The committee recognizes as a need for development in the industry a more complete and exact knowledge of the constitution of lignin, because the sulphite process, or any pulp making process, must be regarded as a process for converting the lignin and encrusting matters of wood into soluble form. For this reason we are publishing in translation the fundamental researches of Dr. Klason on the constitution of lignin. These will serve as a foundation for future work in this field.

Prof. Dr. Klason sent these contributions to the chairman during the last year, and also granted his permission to us to publish them. Great thanks are also due one of our members, Engineer Carl Fineman, for his assistance in doing the main part of the translation work on these and the articles by Dr. Sieber.

Work for the Coming Year

It seems that it is advisable for the committee to select one or two distinct phases of sulphite pulp manufacture or testing and concentrate on those phases during the coming year. We might suggest for the association's approval the working out of a rapid and dependable method for determining residual lignin in unbleached sulphite pulp, for use in mill control.

Another subject that appears worth while investigation is a rapid method for the direct determination of the combined sulphur dioxide in sulphite acid, or combined lime. It seems this forms the main source of contention in all the controversies on acid testing. Discussion of these subjects is invited at this year's symposium.

The committee feels it would be a very valuable asset in pulp and paper manufacture to have a standard method for determination of alpha, beta, and gamma cellulose in pulp, and other chemical characteristics of pulp, but we feel this subject, because of its general value in sulphite, soda and sulphate pulp manufacture, could be handled to better advantage to the industry at large by a specially appointed cellulose committee. While some work has already been done in this direction, we wish to suggest the naming of such a committee.

Recommended Specifications for Limestone and Lime in the Manufacture of Sulphite Pulp

Report to the Technical Association and Approved by Committee on Sulphite Pulp

(Revised March 15, 1922)

1. General

(a) Manufacture of sulphite pulp.

(1) The manufacture of pulp for paper making from wood, by means of the sulphite process, consists of the following operations:

(1) Preparation of the wood,
(2) preparation of the cooking liquor,
(3) cooking of the wood,
(4) washing and screening the pulp,
(5) bleaching the pulp, and
(6) preparation of the finished pulp for shipment.

The use of limestone and lime in this manufacturing process occurs in the preparation of the cooking liquor. This liquor is produced by the reaction between sulphur dioxide and limestone or lime and the two absorption methods in common use are called the tower system and the tank system. The liquor is essentially a calcium or calcium and magnesium salt of sulphurous acid and its function is to affect the non-cellulose part of the wood in such a manner that, in the washing and bleaching process, nearly pure cellulose may be obtained.

(2) Discussion of use of high calcium and high magnesium stone and lime.

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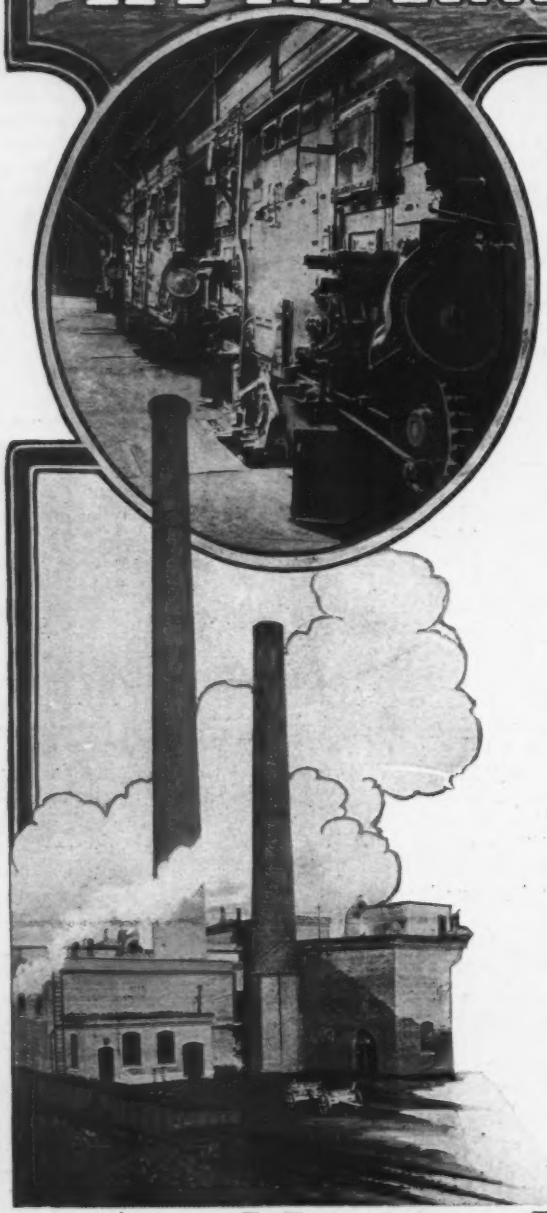

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There is some difference of opinion in this country as to the relative merits of high calcium and high magnesium stone and lime for use in the two absorption systems. The difference in practice in the various pulp mills does not seem to be based on accurate data. As a result of a summary made during the war, the following conclusions may be drawn:

(b) Limestone.

(1) Definition: High calcium limestone consists essentially of calcium carbonate. High magnesium limestone consists essentially of calcium and magnesium carbonates when the proportion of the latter does not exceed 45.5 per cent.

(2) Use of limestone in the tower system.

The tower type of absorption system consists of one or more towers varying in height from 20 feet to 150 feet and charged with limestone resting on gratings. A stream of water, with or without the addition of reclaimed liquor, trickles over this stone, while the sulphur dioxide enters at the bottom, rises and acts upon the moist stone and is absorbed by the downward flowing film of water.

(3) In the tower system, high calcium stone is desired, due principally to the fact that when high magnesium stone is used the calcium carbonate goes into solution first, causing the stone to crumble and leave a slude. For this reason, in a tower system using high magnesium stone, it is customary to have the grates raised 40 to 50 feet and they require frequent cleaning. One mill is using and recommends high magnesium stone. However, most of the mills are using high calcium stone and in fact, several were using marble having a calcium carbonate content of 98.5 per cent. It cannot be said, however, that high magnesium stone cannot be used in the tower system, but it is not the most common practice.

(4) Packing.

Limestone is shipped in bulk in carload lots.

(c) Quicklime.

(1) Definition: Quicklime is the product resulting from the calcination of limestone. It will slake when water is added to it and this slaking is accompanied by an evolution of heat and an increase in volume.

(2) Use of lime in the tank system.

In the tank or milk of lime system, the base is in solution or suspension in a series of tanks, equipped with suitable agitators. The sulphur dioxide is forced or drawn through these tanks successively. The contents of the first tank are drawn off when the liquor has reached a certain strength (3.5 to 6 per cent total SO_2) and the contents of the second and third tanks progress to the first and second tanks respectively. The third tank is again charged with fresh milk of lime, and thus may be considered as a continuous process. In some cases, the tanks are built on top of each other in the form of a tower.

(3) In the tank system, a lime high in magnesium is desired, due to the fact that the magnesium salts are soluble, while the calcium salts are not so soluble and have a tendency to clog the system. But due to variations in tank systems, it is probable that a high calcium lime would give good results in certain instances.

(4) Packing.

Quicklime is shipped either in bulk in carload lots or barrels holding 180 pounds net or 280 pounds net each.

2. Requirements

(a) Quality.

The quality of the stone or lime should be reasonably uniform and in the case of the high magnesium stone or lime, the proportions of magnesium and calcium should be kept as nearly constant as possible.

(b) Limestone.

(1) Composition.

In view of the fact that various systems may use different grades of stone or lime, the requirements of these specifications are so given that they will meet the conditions of the pulp mills in this country. The maximum and minimum quantities are given in the following table:

	High Calcium Stone		High Magnesium Stone	
Ingredients	Max.	Min.	Max.	Min.
Calcium oxide	...	54.0	...	30.2
Magnesium oxide	1.5	...	...	18.8
Oxides of silicon iron and aluminum..	1.5	...	1.5	...
Organic matter	0.5	...	0.5	...

(2) Impurities.

The impurities present in a limestone must be evenly distributed throughout the mass, and must not be concentrated in visible strata or nodules which would clog the grates. The stone shall contain no strata of an argillaceous or organic nature which might cause the pieces of limestone to split.

(3) Size.

Each piece of limestone shall be large enough so that it will be retained on a three-inch ring, but small enough so that it can be lifted readily by one man.

(4) Density.

Limestone shall be of such a density that a block of it will weigh not more than 180 pounds, nor less than 150 pounds per cubic foot.

(c) Quicklime.

(1) Composition.

	High Calcium Lime		High Magnesium Lime	
Ingredients	Max.	Min.	Max.	Min.
Calcium oxide	...	93.0	...	56.0
Magnesium oxide	2.5	...	...	35.0
Oxides of silicon iron and aluminum..	2.5	...	2.8	...
Organic matter	...	...	...	...

(d) Marking.

Each carload of material or fraction thereof, shall be legibly marked with the names of the consignor and consignee and with some means of identifying the particular contract on which the shipment is made.

(e) Retesting.

Notice of the rejection of a shipment based on these specifications must be in the hands of the consignor within 10 days after the receipt of the shipment at the point of destination. If the consignor desires a retest, he shall notify the consignee within 5 days of receipt of the notice of rejection. The consignee shall provide all reasonable facilities to permit the consignor to resample the material. This retest shall be at the expense of the consignor.

3. Sampling and Testing

(a) Sampling.

The purchaser will bear all expense of sampling and testing. When limestone or quicklime is shipped in bulk, the sample shall be so taken that it will represent an average of all parts of the shipment from top to bottom, and shall not contain a disproportionate share of the top and bottom layers. The sample shall consist of one shovelful for each three tons of material, but not less than 10 shovelfuls taken from different parts of the shipment. The total sample taken shall weigh at least 100 pounds, and shall be crushed to pass a 1-inch ring, mixed thoroughly and "quartered" to provide a 15-pound sample. This 15-pound sample shall be crushed to pass a ½-inch ring, mixed thoroughly, and quartered to provide a 2-pound sample for the laboratory. In case a shipment consists of more than one car, a separate sample shall be taken from each car.

When quicklime is shipped in barrels, at least 3 per cent of the number of barrels shall be sampled. They shall be taken from various parts of the shipment, dumped, mixed, and sampled as specified in the above paragraph.

When sampling quicklime, it is essential that the operation be conducted as expeditiously as possible, in order to avoid undue exposure of the material to the air. The sample to be sent to the

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laboratory shall immediately be placed in an air-tight container in which the unused portion shall be stored until the shipment has been finally accepted or rejected by the purchaser.

(b) Testing.

The following directions are a brief summary of the analytical methods which are recommended. For more complete information on this subject, references should be made to the Analysis of Silicate and Carbonate Rocks, by W. F. Hillebrand, United States Geological Survey, Bulletin No. 700.

Blast 0.5 g of the sample for 15 minutes in a platinum crucible. Cool, and transfer to an evaporating dish. Mix to a slurry with distilled water. Add 5 to 10 cc. concentrated HCl. Heat gently until solution is complete, breaking up lumps if necessary. Evaporate to dryness on water bath. Add 5 to 10 cc. concentrated HCl, and dilute with an equal volume of distilled water. Digest on water bath for 10 minutes. Filter, and wash with hot water. Evaporate the filtrate to dryness. Dissolve in acid and water as before. Filter, and wash with hot water. Ignite the two precipitates together, and weigh as silica and insoluble matter.

Dilute the above filtrate to 250 cc. Add HCl if necessary to insure a total volume of 10 to 15 cc. of this acid in this solution. Make alkaline with NH_4OH. Boil until odor of NH_3 is barely noticeable. Filter, and wash slightly with hot water. Dissolve the precipitate with hot dilute HCl, and repeat the precipitation as before. Filter, and wash thoroughly with hot water. Ignite, and weigh as oxides of iron and aluminum.

To the filtrates from the above add a few drops of NH_4OH and bring to a boil. Add 25 cc. of a saturated solution of $(NH_4)_2C_2O_4$. Continue boiling until the precipitate becomes granular. Let stand until precipitate settles clear. Filter, and wash with boiling water. Ignite the precipitate, dissolve in dilute HCl, and dilute to 100 cc. Add excess of NH_4OH, and boil. Filter out any insoluble matter, ignite and weigh, and add its weight to the oxides of iron and alumina found previously. To this filtrate add $(NH_4)_2C_2O_4$, proceeding as before. Filter, and wash with boiling water. Ignite, and blast to constant weight as calcium oxide.

Acidify the filtrates from the above with HCl. Evaporate to 150 cc. Add 10 cc. of a saturated solution of $NaNH_4HPO_4$. Add NH_4OH drop by drop, with constant stirring, until the precipitate starts to form. Then add moderate excess of NH_4OH. Stir for several minutes. Let stand over night. Filter, and dissolve the precipitate in hot dilute HCl. Dilute to 10 cc., add 1 cc. of saturated solution of $NaNH_4HPO_4$, and precipitate as before. Filter, and wash with an alkaline solution made by diluting NH_4OH until it contains about 2½ per cent NH_3 and then adding a few drops of HNO_3. Ignite and weigh as $Mg_2P_2O_7$. Multiply this weight by 0.3621 to find the weight of MgO.

Analysis of Reclaimed Cooking Acid for Sulphite Mills

Read at the Annual Meeting of the Technical Association by Gösta P. Genberg.

In analyzing reclaimed cooking acid, especially when side-relief is used, large errors are likely to occur in determination of the combined SO_2 and the CaO by the methods suggested by Höhn and Winkler. Both of these methods give an altogether too low a result for CaO when calculated from the combined SO_2.

According to Höhn and Winkler, the free SO_2 is determined by titration with N/10 NaOH and the combined SO_2 calculated from the same titration by subtracting the free SO_2 from the total SO_2 determined by titration with N/10 iodine solution. The CaO is then calculated from the combined SO_2. Evidently the titration with N/10 NaOH must be in error due to the presence in the reclaimed cooking acid, of such organic acids as formic and acetic acid, which are formed during the cooking operation and carried back into for cooking acid by the use of the side-relief. Another factor that might make an error in the estimation of the free SO_2 by these methods, is the possible presence of free CO_2 in the acid made from lime rock as pointed out by Oman. These two factors make the result for free SO_2 too high and eventually the combined SO_2 and the CaO will be too low.

For control in the laboratory when a reliable analysis is desired, the following method is suggested:

1. Total SO_2

Withdraw 20 c.c. of the reclaimed acid under pressure and dilute to 500 c.c. in a half-liter flask. Fill the solution in a 50 c.c. burette. Fill another burette with N/16 iodine solution. Take the top readings of the two burettes and run the I_2 solution down in an Ehrlenmayer flask. Let the diluted acid solution run down in the iodine solution until the yellow color disappears. Add more iodine solution until slightly yellow, add the starch indicator and fix the end point. Take the bottom readings.

a = acid reading in c.c.

b = iodine reading in c.c.

$$\frac{5 \times b}{a} = \text{per cent total } SO_2$$

Note: This manipulation eliminates the tendency toward reversibility of the reaction, as

$$SO_2 + I_2 + H_2O = SO_3 + 2HI$$

to

$$4HI + SO_2 = 2H_2O + 2I_2 + S_2$$

2. Organic Matter

Withdraw with pipette 50 c.c. of reclaimed acid in a beaker, add 50 c.c. concentrated HCl and evaporate to dryness. Take up in 5 c.c. HCl and 100 c.c. water, and boil for ten minutes. Filter while hot and wash six times with hot water. Dry at 105° C. and weigh the organic matter.

Note: This does not give the actual organic matter present, but is comparative only.

3. Sulphur Trioxide

The filtrate from above (2) is boiled for five minutes and 50 c.c. boiling $BaCl_2$ solution added. Continue the boiling for five minutes. Allow the precipitate of $BaSO_4$ to settle over night. Filter, wash until free from Cl-ions, ignite and weigh.

a = weight of $BaSO_4$

$0.343 \times 2 \times a$ = per cent SO_3

Note: 0.343 is the factor to calculate the SO_3 in $BaSO_4$. 50 c.c. acid are used for the analysis; therefore two times the amount of SO_3 in 50 c.c. gives the amount in 100 c.c., which is the per cent SO_3.

4. CaO as Calcium Sulphate

CaO and SO_3 in calcium sulphate are combined in the ratio 56:80 = 7:10. Therefore the amount or per cent of CaO as calcium sulphate is calculated from the SO_3 by multiplying with 7/10.

5. SO_2 and CaO Combined as Calcium Monosulphite

SO_2 and CaO as calcium monosulphite, is determined according to Oman:

To 50 c.c. sulphite cooking acid is added with constant stirring drop by drop 15 c.c. 26 per cent ammonia and the precipitate of $CaSO_3$ is allowed to settle for ten minutes. Filter the precipitate and wash three times with 14 per cent ammonia, using 25 c.c. at

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a time. Wash the precipitate down in a half-liter flask, add 5 c.c. concentrated HCl and fill to the mark. Transfer to a burette and run it against N/16 iodine solution as in the determination of total SO_2.

a = number of c.c. diluted acid solution
b = number of c.c. iodine solution

$$\frac{2 \times b}{a} = \text{per cent } SO_2 \text{ as monosulphite}$$

$$\frac{7 \times 2 \times b}{a} = \text{per cent CaO as calcium monosulphite}$$

6. Free SO_2

The free SO_2 is calculated by subtraction of the combined SO_2 determined in (4) from the total SO_2 (1).

In order to check the separate determinations of CaO as sulphate and CaO as monosulphite, the total CaO is determined according to the oxalate method. The CaO combined with the organic matter in the acid is neglected, because the amount falls within the error of the analysis.

7. Total CaO

Twenty c.c. of the reclaimed acid are diluted to 200 c.c. and boiled with HCl until free from SO_2. Add ammonia until alkaline, boil for five minutes, and precipitate the calcium with a boiling solution of ammonium oxalate. Allow the precipitate to settle for four hours, filter, wash, dry, ignite and weigh after cooling in a desiccator.

a = weight of CaO
5 × a = per cent total CaO

Note: When analyzing acids made from limestone one single precipitation is sufficient because the amount of magnesia in the limestone seldom exceeds 1.50 per cent and in the concentration of above the magnesia is not precipitated as oxalate. In case of acids made from milk of lime, the first precipitate of calcium oxalate has to be dissolved and reprecipitated by ammonia, and the magnesia determined in the filtrate as magnesium phosphate.

A series of tests was carried on using this method, during a period of six months June-November, 1921. A wide variation in both the total SO_2 and the SO_2 was noticeable, as shown in the appended table. The acid analyzed was a reclaimed acid made with Jenssen limestone tower acid system. Side relief was used and added to the reclaimed cooking acid; the organic matter present being ca. 0.2 per cent.

Total SO_2	SO_2	CaO to $CaSO_4$	Oman CaO as $CaSO_3$	Sum	Grav. Total CaO	Difference
3.987	0.132	0.093	1.110	1.203	1.199	+0.3%
3.954	0.137	0.090	1.354	1.444	1.537	—6.0%
4.167	0.135	0.089	1.143	1.232	1.187	+4.0%
4.252	0.135	0.109	1.287	1.396	1.331	+4.9%
5.135	0.112	0.078	1.399	1.477	1.478	—0.6%
5.518	0.091	0.064	1.383	1.477	1.423	+1.7%
5.323	0.130	0.091	1.194	1.285	1.298	—1.0%
5.899	0.089	0.060	1.143	1.203	1.236	—2.6%
5.889	0.070	0.049	1.139	1.188	1.189	—0.1%
5.363	0.087	0.061	1.069	1.130	1.122	+0.7%
6.172	0.052	0.039	0.995	1.034	1.061	—2.5%
5.325	0.085	0.060	1.131	1.191	1.201	—0.8%
4.270	0.042	0.029	0.868	0.897	0.932	—3.7%
7.024	0.058	0.040	0.723	0.763	0.770	—1.0%
6.581	0.076	0.053	1.020	1.074	1.074	—0.1%
	0.065	0.046	1.190	1.236	1.253	—1.4%

The average of differences is plus 2.3% and minus 1.8% respectively, indicating that an individual analysis is good within about 2%.

Concerning the Analysis of the Raw Sulphite Acid*

By Dr. Rudolf Sieber

In a preceding paper[1] the differences in results that may be obtained in the titration of the raw sulphite acid according to different methods have been treated. There seemed to be reasons for investigating more closely the causes for these possible errors. I also considered it suitable to test some other suggested modifications in the analytical methods, especially as to their usefulness in the practice, in order to get a complete treatment of the question.

Much has been written about the divergencies in the results of the different methods; Oman[2] especially has drawn the attention to such possible errors. Oman attributes a great influence on the results of the alkali-metric method to the carbonic acid existing in the acid at the time of its preparation. Klason[3] has opposed this opinion, showing by calculation according to the Henry-Dalton law that the raw acid in the mill cannot contain more than 0.001 per cent carbonic acid. If Oman found higher values it must depend upon his method of preparation of the acid, which is divergent from the general practice.

Klason states that he has obtained concordant results with both the Winkler and the Höhn methods.

While the alkali-metric methods according to Oman give too low figures for lime, Thorbjörnsson states that the lime values obtained by himself, according to the Winkler method are about 5 to 6 per cent too high. The cause for this divergency should, according to his opinion, be hydrolytic decomposition of the sodium sulphite formed in the titration.

This explanation is, however, not exactly true. It is easily calculated that the solution in which the titration is made is about 1/200 n. as to Na_2SO_3, if 1 cc. original acid with about 1.60 per cent free acid and 100 cc. distilled water is used. It is also easily shown that the increasing dissociation at strong dilution of the sulphurous acid itself is not accompanied by an increasing hydrolysis of the salt.

If a relatively weak dissociation of the free caid itself is assumed.[4] It may be calculated that the hydrolysis of the salt is about 0.00015 to 0.0003 per cent. If the concentration of the OH ions is calculated from this, the alkalinity, disregarding the (much lower) concentration of H ions, becomes about 0.0000007 to 0.0000016 mol. per liter.

This can no longer be measured with n/10 titration solutions; the concentration of the OH ions is therefore very slightly above the neutral point 10-6.9 mol. H. One may easily convince himself of this fact if one prepares a solution of sodium sulphite of equal concentration. For 100 cc. of the solution slightly colored with phenolphthalein traces of n/10 acid suffice for decolorization. In the solution which is titrated the hydrolysis is, in consequence of the presence of calcium sulphite, still less than that here shown. Any influence of such hydrolysis is impossible, which Klason[5] has also shown already.

For my part I can report that I in different mills almost without exceptions have obtained too high (5 to 15 per cent) values for the free acid with the alkali-metric methods. The observations have been made both on acids prepared from pyrites in tower systems

*A translation, with the special permission of the author, of "Om sulfitsyrans analysering," which appeared originally in Svensk Pappers-Tidning. The translation, by Carl L. Fineman and W. E. Byron Baker, is solely for publication in Technical Association Papers.

[1]Compare Svensk Pappers Tidning, 1920, page 247.
[2]Teknisk Tidskrift, Kemi och Bergvetenskap, 1915, Nos. 4-5.
[3]Papierfabrikant, 1916, page 739.
[4]The values obtained in the literature are not valid for greater dilution than n/10; compare for instance, Landolt-Börnstein, Tabellen.
[5]Klason, Svensk Pappers-Tidning, 1919, Nos. 11 and 12.

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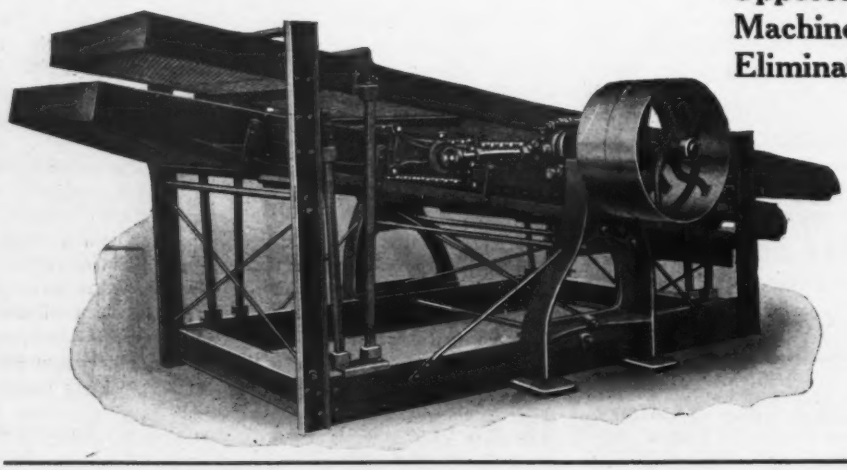

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and on acids prepared from sulphur according to the "batch system," formerly much used in ermany and in America. The divergencies were, as a rule, smaller in the latter than in the former case. For this reason I believed in the beginning, in spite of Klason's opposing opinions, that carbonic acid sometimes may influence the analyses in a bad way. The equilibrium according to the Henry law which determines the carbonic acid contents in the acid, probably does not establish itself so rapidly that the acid always immediately after its preparation is free from harmful quantities of carbonic acid. Since the analysis of the acid is usually performed immediately after its preparation, it is possible to imagine errors caused hereby.

In spite of this I was fully convinced that the greater error, which sometimes was observed, could not be explained simply by this, and I believed it possible to conclude from some earlier observations that errors in the analysis were caused either by the titration liquids or by the distilled water not being completely free from carbonic avid.

In the analysis of the sulphite acid in the practice one works with only 1 cc., which is either used directly or in 10 cc. after tenfold dilution of the raw acid. Herein and also in the low SO_2 contents to be titrated in the acid we find the reason why even small divergencies in the consumption of titration liquid give considerable divergencies in the result. The absolute errors are very minute, but calculated as percent they are very easily perceptible. Since these factors are not always observed, I may here give an example. The raw sulphite acid as a rule contains about 3 per cent total acid and a ratio of free to total acid of about 0.55 to 0.62. We may here assume 0.567. These figures correspond to 9.37 cc. n/10 iodine and 5.40 cc. n/10 NaOH (1.73 per cent free SO_2), if 1 cc. original acid is used. If now only 0.1 cc. n/10 NaOH too much is used in the determination of the free acid, the error is already 1.8 per cent, due to the presence of carbonic acid or something else. Since in the analysis the sample is diluted with much water, usually 1 cc. original acid and 100 to 150 cc. distilled water, it is evident withoout further reasoning what influence the carbonic acid contents of the water may have. According to my observations, 0.3 to 0.6 cc. n/10 $Ba(OH)_2$ is necessary as an average to neutralize the carbonic acid in 100 cc. distilled water. Treadwell[1] states 0.5 to 1.8 cc.; these high figures must, however, only have been noticed in water that had been standing for a long time. But it is evident that even the smallest figures give divergencies of 5 to 6 per cent from the real contents of free SO_2. It is also clear that very different results may be observed in different instances with the same method if this factor is not, which is the rule, duly considered. This is still more true, since the indication of phenolphthalein is uncertain in the presence of carbonic acid and it is left entirely to the analyzing chemist to decide if the titration is finished at the first coloration or only when a standing coloration is obtained.

The alkaline titration liquids are also never completely free from carbonic acid and therefore, strictly speaking, unsuitable for titration with phenolphthalein. Therefore, as a consequence of this, errors may occur. It is therefore justified to attribute a disturbing effect to the carbonic acid contents of the distilled water, of the alkaline titration solution, and finally of the sulphite acid itself. This fact was well known, but I hardly believe that one realized the degree of this influence, hence this explanation here.

I have tried to make the viewpoint clear by some experiments, and also tried to determine which precautions to take in order to obtain satisfactory results from the Winkler and the Höhn methods.

In order to avoid possible errors due to carbonic acid in the titration solution, some experiments were made, using n/10 $Ba(OH)_2$ instead of n/10 NaOH.

The results in Table 1 show that there did not follow any substantial improvement in that case.

[1] Treadwell, Quantitative Analysis, 5th edition, page 455.

TABLE 1.

		CaO According to								
		Höhn		Winkler						
No.	Total SO_2 (Iodine) Per Cent	NaOH Per Cent	$Ba(OH)_2$ Per Cent	NaOH Per Cent	$Ba(OH)_2$ Per Cent	Sander Per Cent	Permg. Per Cent	Gravimetric Per Cent	CaO as $CaSO_4$ Per Cent	CaO, CaO as $CaSO_4$ Deducted Per Cent
1	2.764	0.962	0.940	0.901	0.922	1.044	1.091	1.102	0.061	1.041
2	2.772	0.982	0.989	0.942	0.938	1.082	1.133	1.129	0.087	1.042
3	2.805	0.981	0.970	0.994	0.932	1.106	1.110	1.144	0.070	1.074
4	2.613	0.936	0.982	0.896	0.908	1.021	1.080	1.155	0.088	1.067
5	2.790	1.012	1.023	0.996	1.003	1.103	1.145	1.172	0.052	1.120

TABLE 2.

6	2.815	.....	1.102	.....	1.107	1.159	1.162	1.198	0.058	1.140
7	3.040	.....	1.122	.....	1.132	1.181	1.169	.....	.....	.....
8	2.882	.....	1.145	.....	1.110	1.190	1.240	1.258	0.070	1.180

It has also been tried to exclude the carbonic acid from the beginning from the distilled water by neutralization prior to its use with n/10 baryta water and phenolphthalein indicator. The results became much better, it being of no importance if one titrated as usual or poured the acid sample into an excess of alkali and then neutralized with the acid. Table 2 shows some of the analyses. The greatest divergencies are here about 6.4 per cent, compared to about 15 per cent in Table 1 (calculated on the CaO figures).

This good concordance could, however, not be maintained by this procedure in all tests. Even if the errors were smaller for all the samples than when using the usual method, divergencies often occurred which seemed to be caused by the presence of CO_2 in the acid. In order to eliminate the possible errors from this source the following procedure was followed:

The acid sample (diluted 1:10) was titrated in the known manner with iodine in a porcelain dish. The resulting blue solution was then heated to the boiling point over a small flame and kept for about ten minutes at a temperature close to, but below the boiling point, carefully avoiding superheating of the walls of the dish. For this operation porcelain dishes must be used, because common titration beakers make it impossible to obtain accurate results. In spite of the moderate heating, they give off alkaline constituents. After cooling, the solution was titrated in the known manner with n/10 NaOH and phenolphthalein until rose coloration. A great number of such tests have been made; the results are up to all expectations. Table 3, which does not tabulate more than a part of the experiments made, shows maximum errors of about 2.2 per cent.

TABLE 3.

		CaO According to						
		Höhn						
No.	Total SO_2 (Iodine) Per Cent	Normal Per Cent	After Boiling Per Cent	Sander Per Cent	Permg. Per Cent	Gravimetric Per Cent	CaO as $CaSO_4$	Bisulphite CaO as
1	2.742	1.054	1.120	1.111	1.183	1.189	0.090	1.099
2	3.116	1.142	1.232	1.220	1.258	1.271	0.060	1.211
3	3.085	.....	1.254	1.237	1.291	1.298	0.073	1.225
4	3.328	1.193	1.268	1.285	1.314	1.331	0.065	1.266
5	2.830	1.043	1.125	1.135	1.168	1.196	0.081	1.115
6	2.710	0.931	1.016	1.041	1.082	1.105	0.093	1.012
7	2.925	.....	1.080	1.096	.....	1.152	0.068	1.084
8	2.875	1.078	1.132	1.160	1.192	1.224	0.062	1.162
9	3.020	.....	1.123	1.141	1.185	1.195	0.072	1.123

The color change of the indicator is very sharp in the boiled solutions. It does not change back as it did before.

In some few cases a divergency from the lime value, according to the Sander method, could be noticed, even if this procedure was followed. Whether these divergencies are caused by the presence of polythionic acids, or by something else, has not been determined yet. The number of these cases compared to the number of concordant analyses is, however, very small.

By this I may consider it proven that the above mentioned assumptions regarding the influence of the carbonic acid on the titration results, according to Höhn and Winkler, are right in the case in question. Simultaneously it has been shown that it is possible to obtain accurate results from the Höhn method if certain well

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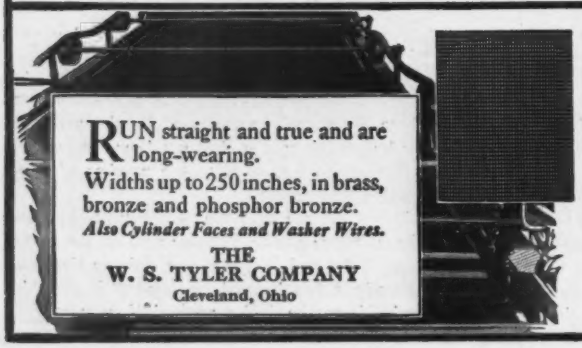

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determined precautions are taken in the test. The conditions may perhaps not give as great divergencies in other places, but everywhere the variation in the magnitude of the divergencies must be noticeable. This is the main uncertainty of the alkalimetric methods as they are generally used.

In respect to the accuracy of the alkalimetric methods, the results here obtained coincide completely with the results of Klason[7] from which latter it may be concluded that the methods are founded on analytically clear facts.

As a consequence of what has been said above, it was logical to try to make the Höhn method independent of carbonic acid present by the use of some other indicator. I have, therefore, tried two other indicators, methyl orange and paranitrophenol, because it gives a more distinct color change (colorless to yellow) than the first mentioned indicator, the change of which from red to yellow is less easy to see for most eyes than the reverse. The change of the paranitrophenol was distinctly visible; at the neutral point the solution was colored faintly yellow upon addition of one drop alkali solution, and upon addition of one to two drops more, distinctly yellow. All titrations were made to that point. In the case of methyl orange the change was visible within 3 to 4 drops. Thanks to the fact that strong acids (H_2SO_4 and HI) were titrated it was possible to obtain good results with these indicators. Table 4 shows how the Höhn method was improved by the use of the two indicators.

TABLE 4.

		CaO According to						
			Höhn					
No.	Total SO_2 (Iodine) Per Cent	Sander I Per Cent	Normal Per Cent	After Boiling Per Cent	P-Nitro-Phenol Per Cent	Methyl Orange Per Cent	Permg. Per Cent	CaO as $CaSO_4$
1	3.058	1.137	1.013	1.170	1.160	1.140	1.129	0.03
2	3.153	1.175	1.070	1.181	1.172	1.175	1.210	0.06
3	2.480	1.022	0.942	1.038	1.009	1.016	1.072	0.04
4	3.008	1.148	1.072	.....	1.143	.....	.....	....
5	2.922	1.082	0.992	1.079	1.085	1.089	1.096	0.03

In connection with the above, I have tested some other suggestions regarding the titration of the raw sulphite acid as to their usefulness in the practice.

A long time ago Streeb[8] suggested to avoid the expensive iodine titration by the use of caustic soda and two indicators, methyl orange and phenolphthalein. First Streeb titrates the acid samples with methyl orange and obtains the first color change when all the SO_2 present exists as bisulphite (methyl orange reacts neutral towards bisulphite). Then he continues the titration and obtains the color reaction of the phenolphthalein when all the SO_2 exists as neutral sulphite. From these two figures it is easy to calculate the composition of the acid. It is consequently possible to save the expensive iodine solution.

It has also been suggested several times[9] that the titration for the free acid be made with normal alkali instead of the n/10 NaOH in order to obtain greater accuracy and independence of the carbonic acid in the distilled water.

A. Sander[10] has finally a short time ago worked out a method for this purpose. This method is also such that the expensive iodine solution is avoided and only n/10 NaOH employed. The method is founded on the fact that bisulphite compounds react with an excess of mercuric chloride under formation of complex mercury compounds (salts of the mercury-sulphonic acid) and hydrochloric acid. For each mol. H_2SO_3 one mol. HCl is formed.

$$Ca\begin{matrix}/\ HSO_3 \\ \backslash\ HSO_3\end{matrix} + \begin{matrix}HgCl_2 \\ HgCl_2\end{matrix} = \begin{matrix}HCl \\ HCl\end{matrix} + \begin{matrix}HgCl.SO_3\backslash \\ HgCl.SO_3/\end{matrix}Ca$$

[7]Svensk Pappers-Tidning 1919, Nos. 11 and 12.
[8]Wochenblatt f. Papierfabrikation, 1894, page 2197.
[9]e. g. Lunge Berl, 6th edition, Vol. 1, page 373.
[10]Wochenblatt für Papierfabrikation, 1920, page 2051.

Sander makes the determination in the following manner: 5 cc. sulphite acid is titrated with n/10 NaOH and methyl orange; by this the free acid over bisulphite is transformed into bisulphite. Like in the first case (Streeb) one cc. titration solution equals 0.0064 g. SO_2. An excess of saturated mercuric chloride solution is now added to the solution, giving the above mentioned reaction as a result. The hydrochloric acid formed is then determined by continued titration with n/10 NaOH and the total SO_2 in the 5 cc. sample determined. From these figures it is easy to calculate lime and bisulphite.

Regarding the applicability of these latter methods, I can communicate the following as results of my investigations:

As to the titration with normal solution, the values do not become better for the free acid; they are still perceptibly higher than the true values. This was, of course, to be expected, since the influence of the carbonic acid cannot be avoided in this manner. One will not find any advantages over the use of a weaker alkali solution.

Almost the same is true of the Streeb method. The real advantage of the iodine saving is offset by other drawbacks. The greatest drawback is the uncertainty of the color change of the methyl orange indicator. The reason for this uncertainty is that the raw acid contains only relatively small amounts of really free SO_2, sometimes even acids are found that are nothing but bisulphite solutions; that is, show a ratio of 0.50. As a rule the really free SO_2, that is, SO_2 over bisulphite, seldom is more than 15 or at the highest 25 per cent of the total SO_2, corresponding to a ratio of 0.575 or 0.62 respectively. It is very easily calculated that if the total SO_2 is 3.00 per cent and the ratio 0.60, the consumption of n/10 NaOH does not reach 1 cc. (assuming that 1 cc. of the sulphite acid is used for the test). If we now consider that the methyl orange hardly gives a clear indication within 0.2 cc. in the titration of the medium strength acid, it is clearly seen that the results, even those obtained by a trained chemist, must be rather uncertain. This is still more true, since the other indication (phenolphthalein) in a colored solution is much less distinct than the change from a colorless solution.

It is not surprising that Goldberg suggested paranitrophenol instead of methyl orange. But, according to my experience, one does not gain very much in this case before one starts to use 5 cc. of the raw acid. In this manner the percentage error is decreased. But the uncertainty at the second indication is in no way diminished, with methyl orange. When paranitrophenol is used this second indication is easier to see.

Due to its complete insensitivity to carbonic acid, methyl orange is, of course, the theoretically right indicator. The color change is, however, not clearly visible to most eyes when weak acids are titrated with n/10 NaOH, and usually an excess is necessary to make it perceptible. This drawback is not at all as serious in the case of the other indicator (paranitrophenol) wherefore it is to be recommended. But in both cases the titration is much more difficult than when, for instance, sulphuric acid is titrated.

Regarding the Sander alkalimetric method, I wish to say the following: The carrying out of this test requires great attention, as the same conditions prevail in respect to the indicator as in the Streeb method. As a rule, one also obtains somewhat too high figures for the free acid according to this method. The second indication is, however, much more accurate and distinct. Good results may be obtained according to this method, but hardly by anybody who is not familiar with chemical work. Even for such persons the results are not so good if artificial light is used and do hardly show the accuracy of the iodometric methods with their distinct indication. According to my experience, better results are always obtained by untrained persons when using the iodometric methods. It is, therefore, probable that the Sander mercury method may be employed in the laboratories, but not in the mills. The results are sometimes improved also in this case by the use of

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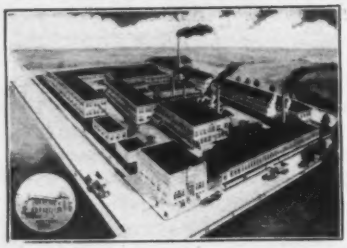

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paranitrophenol, depending upon the personal eyesight of the analytical chemist. The results tabulated in Table 5 partly show slightly lower figures for the total acid. This might possibly be explained by the presence of other sulphur compounds, reacting only with iodine. This procedure might, therefore, give the best results if some other indicator, more suitable for n/10 solutions and bisulphite, was available (methyl red). The Streeb method mostly gives somewhat too high figures on SO_2 and correspondingly too low on CaO. This is, however, chiefly to be attributed to the uncertainty of the indication and the deportment of phenolphthalein towards carbonic acid. In spite of this, I would recommend, for the mentioned reasons, the iodometric method for the determination of total acid in the mill. The free acid may be determined either according to Sander's first method or according to the Höhn method, using methyl orange as an indicator. For laboratory use and for more elaborate investigations the new Sander method is suitable; I would advise the use of n/5 titration solution and not too great dilution.

TABLE 5.

	Sander I			Streeb		Sander II		
No.	Total SO_2 Per Cent	CaO Per Cent	Winkler n/1 NaOH CaO Per Cent	Total SO_2 Per Cent	CaO Per Cent	Total SO_2 Per Cent	CaO Per Cent	Permg. Per Cent CaO
1	3.002	1.112	1.043	3.100	1.078	3.032	1.092	1.144
2	2.573	0.952	0.928	2.628	0.930	2.602	1.005	1.026
3	3.010	1.142	.....	3.085	1.110	2.982	1.111	1.151
4	3.042	1.181	1.092	3.021	1.106	.....	.....	.....
5	3.302	1.332	.....	.....	.....	3.291	1.301	1.352
6	2.645	1.087	0.998	2.470	1.051	2.605	1.003	.....
7	3.721	1.354	1.211	3.809	1.219	3.640	1.300	1.372
8	2.486	1.015	0.972	2.580	1.000	2.456	1.015	1.058
9	3.100	1.256	1.179	3.280	1.212	3.158	1.274	1.342
10	3.328	1.283	1.210	3.350	1.210	3.305	1.232	1.365

It must, therefore, be possible to obtain not only dependable figures for the composition of the acid prepared, but also, what is not less important, a means to determine more accurately the working methods and the utilization of the raw materials in the acid-making department. This is finally the chief object of the control analyses. With the methods used hitherto it has been possible to reach this goal only approximately, because they have given figures, more or less divergent from the true ones, according to the conditions. The newer or modified methods give much more accurate results; the average errors are hardly more than 1 to 2 per cent. The errors in the CaO figures are a little greater, but not at all as deceptive as in the case of the alkali-metric methods used up to the present time.

Synopsis. The results of a comparative investigation regarding the usefulness in the practice of older and newer methods for the analysis of raw sulphite acid are given. Sander's methods can be used among the newer ones, and among the older ones a modification of the Höhn method may be used, and these might be recommended for use in the mill laboratory or in the mill itself.

Engineer Per Rosenlund has given me extensive assistance in the carrying out of this investigation.

Contribution to the Knowledge of the Constitution of Spruce Wood Lignin*

By Dr. Peter Klason

That part of the lignin, which contains a sulphite acrolein group and the lignosulphonic acid of which gives cyclic aryl ammonium salts, is in this paper called *acrolein-lignin* or *α-lignin.* It is identical with the calcium lignosulphonate that can be precipitated by $CaCl_2$. But also one other lignin is found in the wood.

Its calcium sulphonate is not precipitated by $CaCl_2$, it gives no cyclic salt, but it contains one carboxyl complex. I therefore here call it *carboxyl-lignin* or *β-lignin.*

1. Acrolein-lignin (α-lignin), $C_{22}H_{22}O_7$.

As I have shown in my previous paper[1], the acrolein complex found in the spruce wood must be present as coniferyl aldehyde.

This, however, represents only about one-half of the α-lignin molecule. It might probably be rather difficult at the present status of organic chemistry to get a definite clue to the constitution of the other half of the lignin molecule if one can not find a fixed point in some known relations. It seems as if we could find this in the observation that the waste liquor from the sulphite digestion of pure wood is clear golden yellow, and when the color is not very strong, it is a little stronger in reflected light. It is impossible to decolorize the solution to any degree by means of animal charcoal. The color is weakened somewhat by zinc dust in alkaline solution, but exposed to the air it regains its previous strength rapidly. It consequently seems as if the acid contains a cromophore group.

Now several yellow dyes exist in the vegetable world, which are present dissolved as glucosides in the sap or imbibed in the cell walls of the wood. They contain all a nucleus of quinoid structure, a γ-pyron ring.

In most cases this pyron is combined with a benzene nucleus to the mother substance chromon, and this finally combines with phenyl to a phenylchromon which has been named flavon. Flavon or its hydroxyl derivitive flavonol is the original substance of several yellow dyestuffs existing in nature, e.g. quercitin (in quercitron).

First we therefore have to investigate how far known facts in harmony with the assumption of flavon or flavonol as the original substance for the lignin.

By precipitation in concentrated waste liquor with calcium chloride I[2] could throw down about one-half of the calcium lignosulphonates existing in the liquor. After purification they showed the following composition:

	1	2	3
C	52.78	53.20	51.63
H	4.95	4.73	5.30
S	6.35	6.57	....
Ca	4.15	4.24	4.04
CH_3O	12.87	.....	....

M. Hönig and J. Spitzer[3] some time ago prepared calcium and barium salts from the waste liquor in the following manner. The sulphonic acids were separated with mineral acids, the acids transformed into the salts mentioned and these latter fractionally precipitated with alcohol. If the composition of the Ba salts is calculated as Ca salts the 4 fractions gave the following figures in per cent:

	1	2	3	4
C	54.95	53.88	53.48	51.52
H	5.23	5.28	5.14	5.39
S	6.84	6.47	6.91	7.02
Ca	2.69	3.03	3.16	3.30
CH_3O	11.66	12.16	12.07	3.20

In conformity with my earlier observations,[4] their sulphonic acid

*A translation, with the special permission of the author, of a "Sonderabdruck," from the Berichte der deutschen Chemischen Gesellschaft, which he sent to the translators, W. E. Byron Baker and Carl L. Fineman. The translation is exclusively for publication in Technical Association Papers.

[1]Ber. 53, 706 (1920).

[2]Arkiv. f. Kemi 3, No. 5; Sv. Kem. Tidskr. 1917, 8.

[3]M. 31, Vol. 1 (1918).

[4]Loc. cit.

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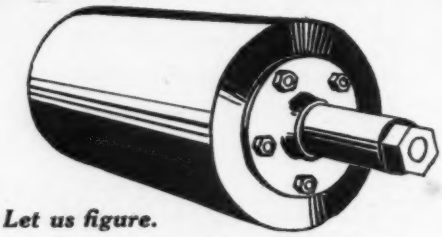

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could not be completely neutralized with barium carbonate. If the correction for this is introduced the result is the following:

	1	2	3	4
C	54.09	53.34	52.89	40.96
H	5.14	5.24	5.10	5.35
S	6.73	6.40	6.83	6.95
Ca	4.20	4.00	4.26	4.34
CH_3O	11.66	12.16	12.07	3.20

The first three fractions are, as the authors also state, fundamentally identical with my salt. The low figure for methoxyl in the last fraction is probably due to the splitting off of methyl alcohol or formic acid during the sulphite digestion.

The empirical formula which I[5] derived from my analysis was $C_{40}H_{44}O_{18}S_2Ca$. The degree of agreement with the average of their and my analyses may be seen from the following table:

		Calc.	Found
C_{40}	480	52.41	52.82
H_{44}	44	4.79	5.08
O_{18}	288	31.45	.....
S_2	64	6.98	6.58
Ca	40	4.37	4.15
	916	100.00	
$4CH_3O$	124	13.53	12.19

The agreement is remarkably good, considering the fact that the figures have been obtained by different chemists on different liquors and that the analyzed substances are amorphous compounds with heavy molecules. One may therefore be entitled to assume that substantially the same material was present on both occasions.

The above mentioned formula $C_{40}H_{44}O_{18}S_2Ca$ corresponds to the lignin formula $C_{20}H_{22}O_{12}$. Since, as will be explained later, there is reason to cut this formula in half, the lignin must have either the formula $C_{20}H_{20}O_8$ or $C_{20}H_{22}O_9$. It is easy to see that the analyses alone cannot decide this. Because it agrees better with the composition of the lignin in the wood, I will here use $C_{20}H_{20}O_8$ as the empirical formula for the α-lignin in the calcium lignosulphonate.

Consequently the formula for the calcium lignosulphonate is $C_{20}H_{21}O_9SCa½$.

		Calc.	Average found	Diff.
C_{20}	240	52.52	52.82	+0.30%
H_{21}	21	4.60	5.08	+0.46%
O_9	144	31.51	....	....
S	32	7.00	6.58	—0.42%
Ca½	20	4.37	4.15	—0.22%

Moreover, disregarding that the calcium salt, even if it can be considered as a chemical individual, might not be present in pure form, it can retain some of the acetyl complex, the main part of which is split off during the cook, which will be mentioned several times more in the following.

It has been known for a long time that acetic and formic acids are formed during the sulphite digestion of fir wood.

In order to determine the quantity of acid 45 g. dry weight of pure spruce wood were cooked with sulphite cooking acid until all the lignin was extracted. 0.945 g. acetic acid was formed. The acetic acid was removed and the solution inverted by heating for 12 hours, acidified with sulphuric acid, on a waterbath. 0.21 g. acetic acid more was thereby obtained, therefore a total of 1.155 g. acid, about 10 per cent of which was formic acid. In the sense of the following, 45 g. wood corresponds to 8.5 g. α-lignin having the formula $C_{20}H_{22}O_7$. According to the calculation 398:60 = 8.5:1.28. 1.28 g. acetic acid should have been formed, assuming that the α-lignin in the wood contains one acetyl group which can be split off, and that must evidently really be the case.

[5]Loc. cit.

A powder of spruce wood (37 g. dry weight) was treated with 400 cc. n-H_2SO_4 for 24 hours on a waterbath. The acid distilled off with steam corresponded to 130 cc. n/10 = 2.1 g. acetic acid for 100 g. wood. Alkali cannot be employed in this investigation because carbohydrates also give acetic acid with alkali.

Assuming that this complex is completely split off, the acetic acid formation corresponds to 2.86 per cent of the dry weight of the wood. Since almost the same quantity of acid is obtained from the lignin by the dry distillation of the wood, we find that the formation of the acid then depends upon the splitting off of the acetyl group by means of steam, helped along by the high temperature.

The acrolein lignin in the wood has consequently the composition $C_{22}H_{22}O_7$. The calcium sulphonate of this lignin is precipitated from its concentrated solution by calcium chloride though, of course, not completely. It is completely precipitated, however, by β-naphthylamine hydrochloride. It is consequently possible to separate completely the α-lignin from the β-lignin with this agent, as the above mentioned cyclic salt. An important part of this investigation is the determination of the ratio of the weights of the α-lignin and the β-lignin.

The lignin was completely extracted from 38.93 g. dry weight from an 80 years old spruce. Obtained: 10.5 g. cycle naphthylamine salt = 7.4 g. α-lignin of the formula $C_{22}H_{22}O_7$ = 19 per cent of the weight of the wood.

By means of sulphuric acid containing 70 per cent H_2SO_4, which does not dissolve even a trace of lignin I[6] have found about 28 per cent lignin in spruce wood. Hägglund[7] determined the same quantity in spruce wood by means of most concentrated hydrochloric acid. In the lignin separated in that manner Hägglund could not show an acetyl group that could be split off, consequently it was completely split off by this treatment. The lignin contents must therefore be increased from 28 to 30 per cent by addition of the acetic acid mentioned which is split off.

As to the wood the following composition (in round numbers) might therefore be assumed:

Carbohydrates	68%
Lignin	30%
Other substances	2%

and the lignin consists of about 63 per cent α- and 37 per cent β-lignin.

I have analyzed the cyclic β-naphthylamine salt from different experiments and fractions and obtained the following results:

	N	S
1.	1.94%	5.26%
2.	2.01%	5.25%
3.	2.12%	5.43%
4.	1.94%	5.42%
5.	2.07%	5.22%
Average	2.02%	5.31%
Atom ratio	1	1.14

Probably the Kjeldahl nitrogen method gives a somewhat too low result, so that the salt in reality contains 1 atom sulphur for 1 atom nitrogen.

Using the formula mentioned for the α-lignin the formula for the cyclic salt becomes $C_{20}H_{20}O_8SN$:

		Calc	Found
$C_{20}H_{20}O_8$	517	....	....
S	32	5.68	5.31
N	14	2.48	2.02
	563		

It is evident from what has been said above, that the sulphur

[6]Verein d. Zellstoff- und Papier-Chemiker, Hauptvers. 1908.
[7]Arkiv. f. Kemi, 1918, 11.

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contents, and therefore also the nitrogen contents, will be found a little too low.

Consequently the salt contains only one acrolein group for the given formula.

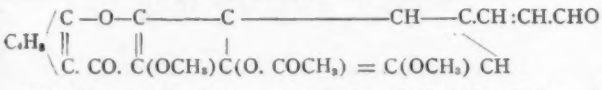
I[8] have tried at an earlier occasion to determine the hydroxyl contents in the α-lignin by the action of p-brombenzoyl chloride on the salt. For 1 atom S, 0.55 atom Br (or OH) was obtained. A considerable contamination with KCl made it impossible to consider the experiment as decisive. It is much better to methylate in alkaline solution with dimethyl sulphate. The reaction proceeds easily even at ordinary temperature, and from the neutralized solution a salt may be obtained by precipitation with alcohol which, like the original, gives the cyclic salt.

This methylated salt gave 19.7 per cent CH_3O. The ratio of the methoxyl contents in the original and the methylated salt is now 2:3.06. In the total salt complex there does not exist, consequently, more than one hydroxyl, but 2 methoxyls.

But since this hydroxyl in the wood itself is acetylated, it follows that the α-lignin in the wood itself does not contain any free hydroxyl.

It is interesting that the methylated salt does not precipitate a glue solution which the original salt does. Hydroxyl or acetoxyl must consequently exist in the coniferyl aldehyde nucleus.

If one wishes to sum up the above given facts in a constitutional formula for the α-lignin, this would look as follows:



This formula is, of course, partly hypothetical, but it has all known quantitative and qualitative facts to its credit.

As we see, according to this conception the α-lignin is built after the flavonol type. The one nucleus must, however, on account of the composition of the lignin be considered as hydrated; this has probably lessened the intensity of the color of the sulphonic acid.

The position of the aromatic nucleus in relation to the chromon nucleus is founded on the fact that according to experiments made by me, and repeated several times, it is impossible to couple the lignosulphonic acid to diazo compounds and in that manner produce azodyes.

Hönig and Spitzer[9] obtained by the fractional precipitation of the barium lignosulphonate, a residual salt, that could not be precipitated by alcohol. On account of the analysis the salt was given the formula $C_{37}H_{37}O_{24}SBa_{1/2}$. It therefore contains considerably less sulphur than the other fractions. It is not improbable that it is a compound of the lignosulphonic acid and a carbohydrate.

That this explanation seemingly is right may be found from the following: If the lignosulphonic acid is completely precipitated from the waste liquor by means of β-naphthylamine hydrochloride in a solution acidified with hydrochloric acid, the precipitate removed and the solution subsequently heated on a waterbath for 12 hours, one obtains upon addition of naphthylamine hydrochloride again a yellow precipitate which is the same cyclic salt. In comparison with the first precipitate the quantity is, however, this time very small.

2. Carboxyl lignin (β-lignin), $C_{19}H_{18}O_9$.

It is mentioned above that the quantity of lignin in fir wood is 30 g. for 100 g. wood, out of which 19 g. is α-lignin, and therefore 11 g. β-lignin, so that the lignin consists of 63 per cent α-lignin and 37 per cent β-lignin. It is also mentioned that the spruce wood is composed of 68 per cent carbohydrates, 30 per cent lignin and 2 per cent other substances.

Without making an error that influences the calculation in a degree worth mentioning we might assume that the "other substances" contain 60 per cent C to 10 per cent H.

[8]Schriften d. Vereins d. Zellstoff- u. Papier Chemiker, 1911, Vol. 2.
[9]M. 31, Heft 1 (1918).

Since the formula for the α-lignin is $C_{22}H_{22}O_7$, the formula for the β-lignin is found to be $C_{19}H_{18}O_9$.

The total lignin has then the following calculated composition:

Carbon		63.45%
Hydrogen		5.20%
Oxygen		31.35%
		100.00%
Carbohydrates	68%, C = $\frac{68 \times 44.45}{100}$	= 30.23%
Lignin	30%, C = $\frac{30 \times 63.45}{100}$	= 19.04%
Other substances	2%, C = $\frac{2 \times 60}{100}$	= 1.20%
	C	= 50.47%
Carbohydrates	68%, H = $\frac{68 \times 6.1}{100}$	= 4.15%
Lignin	30%, H = $\frac{30 \times 5.2}{100}$	= 1.56%
Other substances	2%, H = $\frac{2 \times 10}{100}$	= 0.20%
	H	= 5.91%

The above calculated figures give a good average composition of the spruce wood: C = 50.47 per cent, H = 5.91 per cent.

Whether the β-lignin is a chemical individual or not, its empirical formula must be $C_{19}H_{18}O_9$.

If the α-lignosulphonic acid is precipitated from the waste liquor with α-naphthylamine sulphate, it is possible to precipitate a dark colored salt with methyl alcohol after having neutralized the first filtrate with chalk and concentrated the filtrate. The salt was purified by solution and reprecipitation.

This salt gave, after deduction of the calcium sulphate (2 per cent) 6.26 per cent sulphur and 7.86 per cent calcium. Consequently sulphur and calcium atoms are present in the same number in the salt. From this may be concluded that the β-salt contains both a sulphonic acid and a carboxylic acid group. The simplest conclusion is that while the α-lignin contains an acrolein group, R.CH:CH.CHO, the β-lignin contains an acrylic acid group R.CH:CH.COOH.

The composition is also in harmony with the given formula $C_{19}H_{18}O_9$:

		Calc.	found
$C_{19}H_{18}O_9$	438	....	....
S	32	6.27	6.26
Ca	40	7.84	7.86
	510		
CH_3O	31	6.07	6.44

The salt consequently does not contain more than one methoxyl. It is self-evident that the β-lignin in the wood does not possess a free carboxylic acid group. This lignin must therefore be combined to the carbohydrates in the wood. Since now, as I have shown before[10], the simpler carbohydrates, the pentosans, are in major portions, extracted from the wood, though difficulty, even by water, it is evident that at least the greater portion of this lignin, is combined to the cellulose of the wood. Probably this is also the case in respect to the α-lignin. The lignin can hardly be

[10]Loc. cit.

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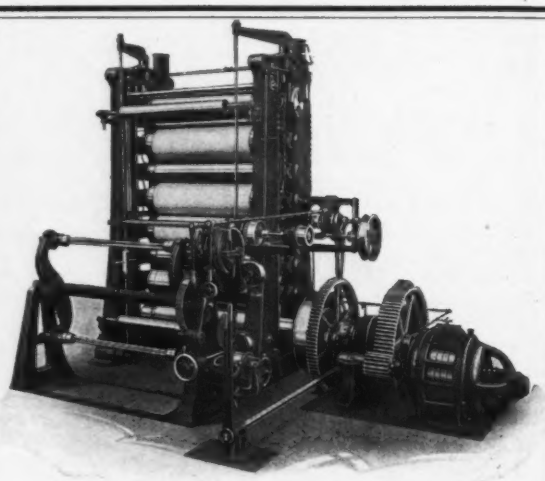

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conceived as having been formed by a secondary transformation of the cellulose. Both probably originate by an assimilation process directly from carbonic acid and water (formaldehyde). The existence of ligin seems, therefore, to be dependent on the existence of chlorophyl.

I believe that the general conception of the origin of the first assimilation product is according to the formula:

$$CO_2 + H_2O = CH_2O + O_2$$

The reaction process for β-lignin then becomes:

$$19\ CH_2O = C_{19}H_{18}O_9 + 10\ H_2O$$

and for α-lignin:

$$22\ CH_2O = C_{22}H_{22}O_7 + 11\ H_2O + 2\ O_2.$$

According to this conception a decomposition of the water likewise belongs to the primary assimilation process.

Starting on the basis that the wood contains 30 per cent lignin of the given composition (which exactly coincides with the composition of the wood itself) and considering that the α-lignin therein (19 g. per 100 g. wood), by treatment of the wood with sulphuric acid of 70 per cent H_2SO_4 or very concentrated hydrochloric acid, loses its acetyl complex, we find by simple calculation that the lignin after the loss of this acetyl group has the following composition:

	α-lignin	β-lignin		
Carbon	11.46	6.44	17.90 g	63.91%
Hydrogen	0.96	0.49	1.45 g	5.17%
Oxygen	4.59	4.07	8.66 g	30.92%
	17.01	11.00	28.01 g	100.00%

Consequently 28 g. lignin must be obtained by treating 100 g. wood in the mentioned manner. But both Hägglund and I have, as mentioned before, determined the yield of lignin to be about 28 per cent. The lignin prepared by means of sulphuric acid has been been anlyzed by me[11], that prepared by means of hydrochloric acid by Hägglund[12]. If it is assumed that besides acetic acid also 2 mol. water are split off from the lignin molecule, the result is the following:

	calc.	found	
		Klasson	Hägglund
C	66.41	66.67	66.40%
H	5.07	5.49	5.42%
O	28.52	.....	.....
	100.00		

[11]Loc. cit.
[12]Arkiv f. Kemi, 1918, 13.

According to the calculation the wood should give 3.78 per cent CH_3O. Benedikt and Bamberger found 4.65, Klasson and Segerfelt as an average 3.77, Hägglund 4.98 per cent[13] I have again determined the methoxyl contents of the spruce wood with the utmost care and using fresh hydriodic acid of the sp. gr. 1.74 and found 4.09 and 4.04 per cent. Disregarding the possibility that the methoxyl contents in the spruce wood may vary to some extent, I may here draw the attention to the fact, discovered by Tiemann, that coniferyl alcohol yields not only methyl iodide, but also some ethyl iodide, evidently originated from the complex $R.CH:CH.CH_2OH$. Because a related complex is present in the lignin in the wood normally, a little more iodide than equivalent to its methoxyl contents must be produced. The methoxyl contents in coniferin I determined to 9.73 per cent, calculated 8.20 per cent. The concordance between the calculated and the determined methoxyl contents in the wood is therefore complete.

According to the calculation the lignin prepared with acid should show 14.5 per cent CH_3O. Häggland found 14.39 per cent. One determination made by me gave 14.3 per cent.

The weight ratio between α-lignin and β-lignin and also the total lignin contents may be considered variable to some extent. The somewhat varying composition of the wood and also the varying statements of the heat value of the wood point in that direction. Because the β-lignin has a considerably lower heat value than the α-lignin, a slight variation between them must influence the heat value perceptibly. But on the other hand the ratio of the α-lignin to β-lignin is close to 2 mol. of the first for one of the latter. It might not be improbable that this is no mere chance happening, but that the greater part of the lignin is a compound of these two which is combined as a carboxylic acid directly with the cellulose. The conformity with the tannins would then be complete.

It may be concluded from the above said, that in the case of complete extraction of the lignin from 1 kg. spruce wood 79.1 g. SO_2 and 34.6 g. CaO must be combined to the lignin. The reports of the test cooks in the industry give for well cooked pulp about 76 g. SO_2 and 32 g. CaO, whereby, however, must be noticed that the aldehyde complex of the α-lignin in the waste liquor is not completely saturated with sulphite. The carboxyl group in the β-lignin and the acetic split off exist uncombined in the waste liquor.

[13]In the instructions for Methoxyl determination, one occasionally finds that a little amorphous phosphorus is added to the hydriodic acid. This can, however, cause the formation of hydrogen phosphide, which precipitates silver phosphide in the silver solution, which leads to too high results.

Concerning Lignin and Lignin Reactions*

By Dr. Peter Klason

In my first experiments in the chemistry of wood pulp manufacture[1] I showed that the sulphurous acid in the sulphite digestion is combined in two ways, i. e., firmly and loosely, and as a working hypothesis I assumed that in the first case the sulphurous acid combined to an ethylene complex, analogous to, taking as an example, allyl alcohol + bisulphite:

$CH_2:CH.CH_2OH + H.SO_2.OH = CH_2CH(SO_2.OH).CH_2OH$,

in the latter case analogous to the known reaction of aldehydes and ketones to bisulphite. This process is reversible so that the free bisulphite in the solution is in equilibrium with the combined sulphite. Should the first be neutralized, an equal amount would be set free from the combined sulphite to establish a new equilibrium. This reversibility may be shown in the sulphite waste liquor in the following manner:

2 cc. waste liquor are diluted with distilled water to 100 cc. whereupon it is neutralized with lime water, using phenolphthalein as an indicator. In this certain case 8.2 cc. lime water = 3.67 cc. n/10 sufficed. If this neutralized solution was left standing for 30 minutes 0.4 cc. lime water = 0.18 cc. n/10 were consumed, and after 12 hours more 0.7 cc. lime water = 0.31 cc. n/10. After the first neutralization 0.6 cc. n/10 acid had consequently been formed gradually. The progress of this reaction can also be determined by the use of an iodine solution. In this case 5 cc. waste liquor consumed 4.2 cc. n/10 iodine. After one hour 0.45 cc. more, after a second hour 0.25 cc. and after subsequent 18 hours 0.6 cc. = a total of 1.30 cc. n/10 were consumed, equivalent to 0.52 cc. for 2 cc. of liquor. The latter experiment does not differ appreciably from the first one.

Later[2] I made the assumption that the lignin of coniferous woods had a constitutive similarity to coniferyl alcohol. This is, accord-

*A translation with the special permission of the author of a "Sonderabdruck" from the Berichte der Deutschen Chemischen Gesellschaft, which he sent to the translators, Carl L. Fineman and W. E. Byron Baker. The translation is exclusively for publication in Technical Association Papers.
[1]Tekn. Tidskrift, afd. Kemi 1893, 11.

[2]Sv. Kem. Tidskrift 1897, 135.

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ing to the well known investigations of Tiemann, built up in the following manner:

$$C_6H_3\begin{cases}CH:CH.CH_2.OH\ (1)\\ OCH_3\ (3)\\ OH\ (4)\end{cases}$$

The compound is consequently a substituted allyl alcohol, R.CH:CH.CH$_2$.OH. One might assume that a part of the allyl alcohol complex might exist in an isomeric aldehyde form or as coniferyl aldehyde, R.CH:CH.CHO. This assumption is in line with all known facts. Since no other theory of the constitutional structure of lignin and the sulphite process has been able to carry weight with the pulp industry (to which it is of paramount importance) and since no other, so far as I know, exists, the theory has been generally accepted. However, a theory, no matter how well founded, has not the value of a proven fact. It is evident that the foundation of such a great and worldwide industry as the manufacture of sulphite cellulose must be built upon the most possible complete knowledge of the chemical structure of lignin, or at least, of those complexes which are active in the digestion process.

Among botanical physiologists lignin is characterized by the so-called lignin reactions, above all Wiesner's phloroglucinol and hydrochloric acid reagent, which gives a red coloration. The aromatic amines are also good reagents, which, as a rule, produce a yellow color. Now we also know that vanillin and phloroglucinol produce a red color, and that with aromatic bases a yellow stain results. The assumption that the lignin reactions were due to the presence of vanillin, as first pointed out by Singer,[3] has been accepted almost generally. It also attained a certain degree of probability when V. Grafe[4] could produce vanillin even in crystallized form by the fusion of dried waste liquor with lime. I[5] was able to verify this statement through the preparation of protocatechuic acid directly from lignin by potash fusion.

H. Wichelhaus and M. Lange[6] subjected wood to superheated steam at 180° C. and found substances in the solution, which, upon being extracted with ether, produced lignin reactions, yet did not consist of vanillin.

Several years ago I made the following important observation in the chemistry of lignin. Salts of aromatic amines produce precipitates in the sulphite waste liquor under certain conditions. It is possible, especially when the liquor has been exposed to the air for some time, to precipitate almost completely lignosulphonic acid with, for instance, naphthylamine salts, leaving only carbohydrates in the solution. This observation made possible the investigation of the sugars in the liquor.[7]

Here I will give a short report of the reactions between lignosulphonic acid and the aromatic amine salts. β-naphthylamine proved to be the most practical base for this investigation.

Upon removal of the reversible combined sulphite the β-naphthylamine salt produces a bright yellow precipitate in acid solution. This really is a highly remarkable phenomenon. It is hard to believe that an ordinary ammonium sulphonate should show such a degree of insolubility. When dried the salt cannot be fused, but in the solution it melts at about 70° C. to a viscous mass; when the salt has been dried it is furthermore almost insoluble therein. The aniline salt shows some signs of crystallization ability, about which future experiments will decide.

However, one may next assume that the salt is a normal naphthylamine salt of lignosulphonic acid. The following experiment shows, though, that it fundamentally is something else: if the salt is treated with alkali and gentle heating it goes into solution and *naphthylamine precipitates*, just what must happen if a normal ammonium salt were there. If now the naphthylamine is removed by extraction with ether, one gets a clear, red-brown solution. If this now is strongly acidified with hydrochloric acid, a yellow precipitate results, having the same properties and the same composition as the original precipitate. The naphthylamine is namely only partially driven out of the salt by the alkali treatment. If the precipitate is filtered away and naphthylamine hydrochloride added to the filtrate, the same yellow compound is likewise obtained.

These facts can hardly be explained in any other way than that the complex R.CH:CH.CHO is present in the lignin. The reactions are then the following:

1. $R.CH:CH.CHO + H.SO_3.OH =$
2. $R.CH_2.CH(SO_3.OH).CHO + C_{10}H_7.NH_2 =$
   $R.CH_2.CH(SO_3.O.NH_2.C_{10}H_7).CHO =$
3. $R.CH_2.CH\begin{cases}SO_2.O\\ CH:NH.C_{10}H_7\end{cases} + H_2O$

We therefore obtain an inner ammonium salt with naphthylamine coupled to the aldehyde complex, so that the whole forms a cyclic compound. This explains as well the insolubility in water as in dilute acid, and the color. If this salt is treated with alkalies the ring is broken in two forms, in part the alkali salt of the acid $R.CH_2.CH(CH:N.C_{10}H_7).SO_3.OH$ is formed, in part also the alkali salt of the lignosulphonic acid itself and free naphthylamine. It is now evident that upon addition of acid to the former salt the cyclic ammonium salt mentioned must be regenerated since the coupling occurs in acid solution and also that the same cyclic salt must be formed upon addition of a naphthylamine salt to the liberated lignosulphonic acid. It may, however, be mentioned that one does not obtain this good result with all bases. The reaction may also proceed in such a manner that the coupling product is completely broken up.

The reactions are so clear that no other interpretation seems possible. The lignin consequently must contain the acrolein complex, R.CH:CH.CHO, as a constitutional and fundamental part.

The precipitate does not possess exactly constant composition The nitrogen contents is about 2 per cent, the sulphur contents 5.5 per cent. It therefore contains about 1.2 atoms S for one atom N. Probably the nitrogen determination according to Kjeldahl gives slightly too low results for the N contents.

Using fresh waste liquor one obtains per liter liquor with about 10 per cent dry substance about 41 grams of the yellow precipitate; if the liquor has been exposed to the air for years, one obtains about 50 grams. This cannot be easily explained in any other way than that the lignin contains not only the complex R.CH:CH.CHO but also the corresponding alcohol R.CH:CH.CH$_2$.OH, which is gradually oxidized by the oxygen in the air to the corresponding aldehyde. It is also possible that the ratio between the compounds varies in the wood itself.

The simplest aromatic forms of the mentioned complexes exist in cinnamic alcohol and cinnamic aldehyde. Compounds belonging to the cinnamic series are very common in the vegetable world.

Cinnamic aldehyde is the chief constituent of cinnamon oil and cassia oil. As a necessary complement to the investigation it was necessary to determine the deportment of the cinnamic aldehyde towards phloroglucinol and aromatic amines. It was found that cinnamic aldehyde gives a splendid red color with phloroglucinol and hydrochloric acid or Wiesner's reagent, reminding one of the corresponding lignin reaction but of a shade more like vermilion. From the literature we know that the cinnamic aldehyde is easily combined with aniline or naphthylamine to form yellow compounds, for instance $C_6H_5.CH:CH.CH:N.C_6H_5$, and this I could also verify. If cinnamic aldehyde is heated in sealed tubes at 100° C. with sulphite cooking acid it is slowly dissolved. If the sulphite is then removed, β-naphthylamine hydrochloride precipitates a yellow substance. Proportionately to the coupling a plastic

[3] M. 3, 409.
[4] Sitzungsber. d. Wien. Akad. d. Wiss., Abt. 1, 113, 253. (1904).
[5] Sv. Kem. Tidskrift 1917, 15.
[6] Ber 49, 2001, (1916); 52, 2054 (1919).
[7] Sy. Pappers Tidning 1917, 176.

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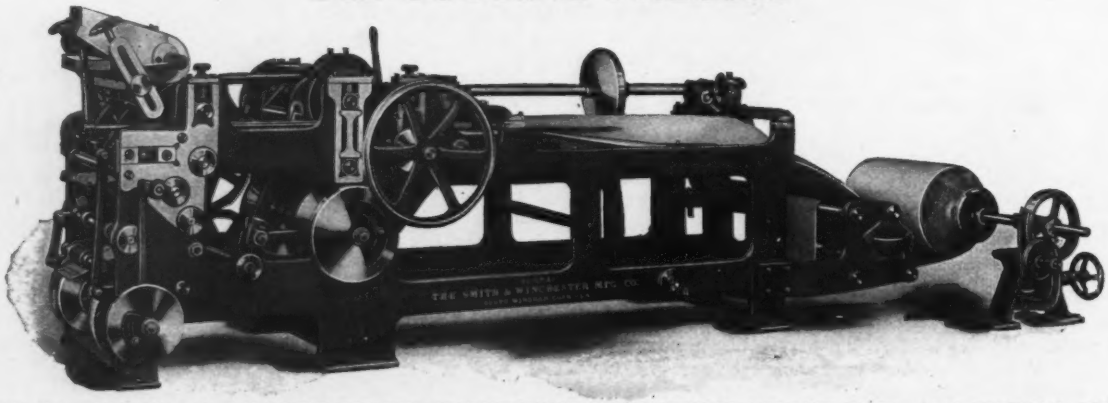

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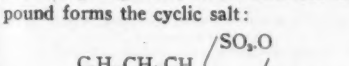
mass is precipitated, which becomes hard in the cold. The compound forms the cyclic salt:



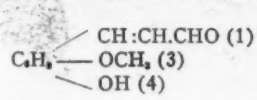
Calculated N 4.13, S 9.44
Found N 3.90, S 9.72.

The salt is soluble in methyl alcohol and difficultly soluble in water. The solution is fluorescent. It contains, like the corresponding lignosulphonate, somewhat more than one atom sulphur (1.08 atoms) for one atom nitrogen and is so similar to the lignosulphonate that they can easily be confused. For instance, it turns doughy in methyl alcohol before it dissolves. It is also decomposed by alkalies in the same manner. I hope to be able to report more extensively on these compounds at a later occasion.

Cinnamic aldehyde also coincides with the lignin in the wood in that respect that it is resinified by mineral acids. Consequently it is not only a hypothesis that the cinnamic aldehyde group exists in the lignin as a fundamental constituent, but it must be considered as a fact.

The great physiologic importance of the facts here shown is evident if we remember that all the phanerogams and vascular cryptogams give lignin reactions and that the lignin is almost one-third of the whole mass of the wood. They also have considerable technical importance. The chemistry of the sulphite cooking process depends on this aldehyde group.

In conformity with the formula given on page 1 for coniferyl alcohol the coniferyl aldehyde must have the following composition:



The position 1, 3, 4 is derived from the fact mentioned above that vanillin is obtained by heating sulphite waste liquor with lime.

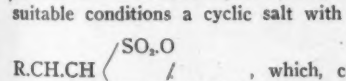
It can also be added hereto that, as I have already mentioned at another occasion,[8] methyl, ethyl and n-propyl creosol are obtained by the dry distillation of coniferous wood, all having the position 1, 3, 4.

We find likewise in the n-propyl creosol the three carbon atoms of the coniferyl alcohol and the coniferyl aldehyde.

It is consequently not vanillin in the wood that causes the lignin reactions, but coniferyl aldehyde. This also explains how Wichelhaus could obtain decomposition products of the wood that gave lignin reactions.

We consequently find that coniferyl aldehyde (and coniferyl alcohol) are fundamental and at the same time the only outwardly chemically active components of the coniferous lignin, which all is in good harmony with the hypothesis made by me. The investigation is continued.

In the first part of this paper[9] I have shown that the spruce wood lignin contains an acrolein group, R.CH:CH.CHO, which is present in the sulphite waste liquor combined to sulphurous acid as the acid $R.CH_2.CH(CHO).SO_3.OH$. This latter gives under suitable conditions a cyclic salt with aromatic amine bases, e. g.,



, which, contrary to the normal salt, has an intense egg-yolk color. The cyclic salt cannot be formed when tertiary bases, e. g., pyridin or quinolin, are employed. Quinolin hydrochloride produces indeed also a precipitate in a solution of lignosulphonic acid acidified with hydrochloric acid, but this precipitate is white and does not turn yellow secondarily.

The white precipitate first produced by, for instance, a naphthylamine salt is consequently the normal salt of the lignosulphonic acid, which later by ring formation transforms into the yellow cyclic salt in an acid solution. The ring formation occurs sometimes so easily in a strongly acid solution that it is unnecessary to remove the SO_2 loosely combined to the aldehyde group, but the ring formation then proceeds under liberation of SO_2.

We must now settle the question about the existence of this acrolein group in the whole infinite vegetable world. First, as to the trees I have made sulphite digestions with the woods of some of our more common trees, viz., spruce, birch, beech, oak, linden, alder, aspen and willow. It was found that the lignin could be extracted completely from all the different woods. From the solutions cyclic, yellow β-naphthylamine salts could be obtained, having fundamentally the same appearance and properties as that prepared from fir. They could be prepared according to the same method, used in the case of the common waste liquor from fir wood.

The analyses of the naphthylamine salts gave the following results, calculated in percent:

	N	S
Spruce (Fichte)	2.07%	5.22%
Pine (Kiefer)	1.95%	5.34%
Birch	2.40%	4.84%
Oak	1.82%	5.02%
Aspen	1.87%	4.84%
Willow	2.04%	5.43%
Beech	2.00%	5.26%

The composition as to nitrogen and sulphur is consequently fundamentally the same for them all. Even if the lignin in these cyclic salts from all these different woods certainly is not identical, it is probable that it in all the cases is built after the same type.

The lignin is, however, also extracted from the herbaceous plants by means of sulphite digestion, and, as far as I have been able to ascertain, similar yellow cyclic aryl ammonium salts can be obtained from the solutions. These, however, have a fundamentally different composition, which will be shown more extensively at a later occasion.

We therefore obtain from the present rather incomplete investigation the opinion that the lignin reactions are due to the acrolein complex mentioned, which consequently for the present may be conceived as being as common as the lignin. This is especially true concerning the phanerogamous plants.

[8] Sv. Kem. Tidskrift 1917, 14.
[9] Ber. 53, 706, (1920).

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A paper treasure which money hardly could buy, hangs in a frame in the office of Lindsay Brothers, 806 Sansom street, Philadelphia, distributors of the Westvaco mill brand paper. It is a watermark, believed by the firm to be the oldest in the United States and valued not only as such, but because of the particular interest to this firm which many years afterwards had an almost identical watermark which it believed to be original, but which clearly had been used a century before. The letter on paper that is still good, written back in 1793, gives undisputable evidence of that fact.

The epistle which hangs in the Lindsay office was written by an old time worthy, Wm. Hugheslett on August 27, 1793, in Baltimore, but it was not mailed until September 6, 1793, and then sent on its way to the Robert Gilmore Company of Baltimore. The envelope, still preserved, shows that 40 cent postage was paid for the trip of about forty miles. Like all old-time letters, it was sealed with a great splotch of red wax and stamped with a great seal.

Investigation shows that the paper of the letter was made at the Gilpin mill on the Brandywine, near Wilmington. This old mill, dating back to Revolutionary days, made writing papers out of new linen cloth. The business was continued until half a century ago and remains of the old mill stood until quite recently.

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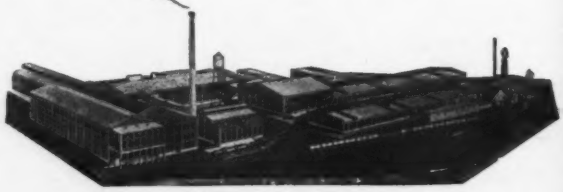

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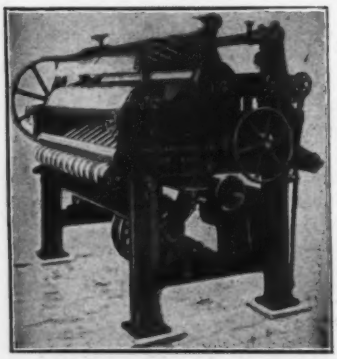

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The Chemistry of the Sulphite Process

Read at the Annual Meeting of the Technical Association by R. N. Miller[1] and W. H. Swanson[2]

In spite of the great advances that have taken place in the manufacture of sulphite pulp, there remains much uncertainty, lack of knowledge, or misinformation relative to the progress of the reaction and the conditions under which it must take place to produce pulp of the desired properties.

It has been long accepted that the fundamental reactions in the cooking of sulphite pulp are a hydrolyzing action and a sulfonation which separate the ligneous material from the fibers and transform it into a substance that is soluble in water. Much work has been done to determine the constitution of the materials dissolved and from the knowledge of the end products the course of the reaction has been deduced. The names of Klason, Schwalbe, Heuser, Klein and their co-workers head a long list of those who have contributed to the knowledge of the composition and reactions of the materials dissolved from the wood in the course of the cook. When, however, information is sought as to the method by which sulphite with the desired properties is to be made, the conditions under which it must be cooked, the strength of acid to be used, etc., one is at once struck by the dearth of exact public information of a fundamental character. Much of this information is the property of every well operated sulphite mill and is the accumulation of years of experience, but it is also true that knowledge applicable in one mill may not be at all applicable in another.

It is the purpose of this paper to bring out the methods by which it is hoped to arrive at the fundamental knowledge of the sulphite process, and to show their application to the preliminary study as carried out in one series of cooks at the Forest Products Laboratory.[3]

Method of Attack

It was thought that if information could be obtained covering the composition of the cooking acid, the character of the pulp, and the nature and amount of materials that had been removed from the wood at different stages in the cook, conclusions could be drawn as to what had happened in the digester; and if a series of cooks could be made under the same conditions, and blown prematurely, examination of the pulp and liquor at the end of each prematurely blown cook would be equivalent to examining them at intervals during a single cook. In fact, the only way to get a sample of pulp that will really show the changes taking place in the wood and be representative of the digester contents is to blow and sample the entire charge.

To avoid entirely the effect of the variable of dilution from condensed steam, it was decided after some preliminary cooks to make the cooks of this series by heating with indirect steam. The temperatures and pressures decided upon were within the range of any mill, and the strength of acid while not that which has become generally recognized as the most desirable to use, is the same as that being used in a plant in this country to produce a pulp of very high grade. The duration of cook and the temperature rise was that which preliminary trial showed would produce a pulp comparable to commercial pulps in point of strength. The approach to uniformity of conditions can be judged by the table, Fig. 1, which is that of the total SO_2 content in per cent in all cooks at all sample periods.

FIG. 1.—TABLE OF CONCENTRATION OF SO_2 IN ALL COOKS.

Cook No. Hours	630-I	629-I	626-I	625-I	634-I	633-I	631-I	632-I
4	3.14	3.02	3.06	2.90	3.05	2.89	2.99	3.18
7	2.36	2.40	2.48	2.44	2.36	2.28	2.38	2.52
9	...	1.50	1.71	1.57	1.35	1.35	1.48	1.38
10	...	...	0.98	1.10	.93	.98	0.90	.99
11	...	...	...	0.83	.81	.81	.73	.69
11½	...	...	...	...	.61	.69	.65	.61
12	...	...	...	...	...	.57	.57	.59
12½	...	...	...	...	...	...	.49	.39
13¼	...	...	...	...	...	...	...	.18

It is proposed to continue this work using direct steam as the source of heat and numerous other acid compositions and temperature-pressure combinations, but in this preliminary study the conditions easiest to control were selected.

Apparatus

The digester, having a capacity of about 50 lbs. pulp, at the Forest Products Laboratory, was used in this series of cooks. This digester is a replica of the ordinary upright digester, and has, in addition to the direct steam heating connections, a lead coil installed in the lower half of the digester for indirect heating. A separator was installed below the relief cooler and a receiver connected to catch all condensable relief. The gaseous relief was caught in a tank of water. To make possible the drawing of cold samples from the digester a small lead pipe cooler was attached to the sample plug. This arrangement made it possible to check up on the quantities of materials that were in the digester, or in the relief receiver, or the gas absorption tank at any time in the

[1] Chemist in Forest Products, U. S. Dept. of Agriculture, Forest Service, Madison, Wisconsin.
[2] Assistant Wood Technologist, U. S. Dept. of Agriculture, Forest Service, Madison, Wisconsin.
[3] Work directed toward a similar end is reported by A. Chambovet in Papeterie XI., May 25, 1919, et seq. trans. in Paper XXVII, Jan. 26, 1921, et seq.

FIG. 2.—COOKING DATA AND PHYSICAL TESTS

Cook No.	Date 1922	Lbs. chips B.D.	Gals. H_2O in chips	Gals. acid	Gals. cooking liquor per 100 lb. B.D.Wood	Max. temp. °C.	Time to max. temp. Hrs.	Cook duration Hrs.	Total SO_2	Free SO_2	Combined SO_2	Yield of unscreened pulp %	Screenings %	Yield of screened pulp %	Bleach. %
630-I....	2- 1	101.6	3.40	59.5	61.9	133	7	7	3.78	2.37	1.41	80.8	Not screened	80.8	Not bleached
629-I....	1-31	97.5	3.30	57.0	62.2	145	8½	9	3.82	2.42	1.40	62.8	Not screened	62.8	Not bleached
626-I	1.21	90.6	3.08	55.0	64.9	145	8½	10	3.74	2.36	1.38	64.0	0.7	63.3	30
625-I....	1-12	92.3	3.18	57.0	65.1	145	8½	11	3.81	2.40	1.41	51.0	0.7	50.3	30
634-I....	2-14	98.9	3.33	57.0	61.0	145	8½	11½	3.80	2.38	1.42	50.58	1.08	49.5	30
633-I....	2-10	99.0	3.36	57.5	61.5	145	8½	12	3.79	2.39	1.40	51.3	0.0	51.2	30
631-I....	2- 3	102.0	3.48	56.5	58.8	145	8½	12½	3.82	2.42	1.40	51.6	1.2	50.4	30
632-I....	2- 8	95.9	3.24	58.25	64.1	145	8½	13¼	3.82	2.41	1.41	47.05	0.75	46.3	30
636-I....	3- 7	88.3	3.28	58.5	70.0	137	15	15	5.60	4.46	1.14	48.43	0.13	48.3	15

Cook No.	Machine Run: Weight per ream lbs.	Mullen test lbs., sq. in.	Strg. factor Points 1/10000"	Strg. factor Pts., lb	Breaking length Meters	% Stretch	Folds	Temp.°F	% Humidity	Ball Mill: Max. strg. lbs. sq. in.	Time to max. strg. Min	Tear lbs.	Time to max. tear. Min.	Double folds	Time to maximum folds Minutes
630-I.....	Pulp, raw—not tested														
629-I.....	Pulp, raw—not tested														
626-I.....	56.6	32.2	0.69	0.57	5960	1.7	58	65	64.5	119	80	1.5	40	670	60
625-I.....	51.9	46.8	1.09	0.90	6410	2.1	389	69	65	109	60	2.3	40	1,030	40
634-I.....	51.0	36.1	0.99	0.72	6030	2.7	271	66	65.5	99	60	1.8	20	730	40
633-I.....	47.0	35.9	1.01	0.76	5450	2.1	426	71	65	109	60	2.2	40	700	60
631-I.....	46.0	28.5	0.84	0.62	5830	1.8	223	81	65	98	60	1.9	40	910	80
632-I.....	48.1	34.9	0.95	0.72	6080	2.1	363	68	65	85	60	2.5	80	1,500	40
636-I.....	53.8	40.0	0.88	0.74	6120	2.5	283	70	65	95	60	1.8	20	1,220	40

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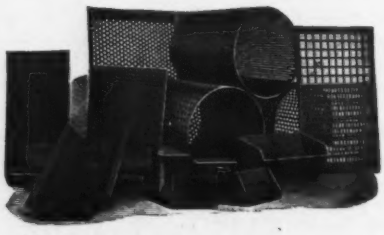

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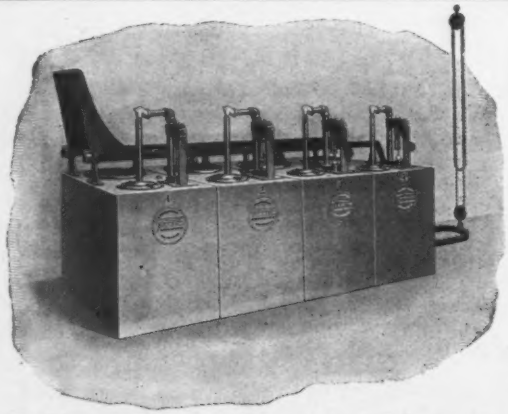

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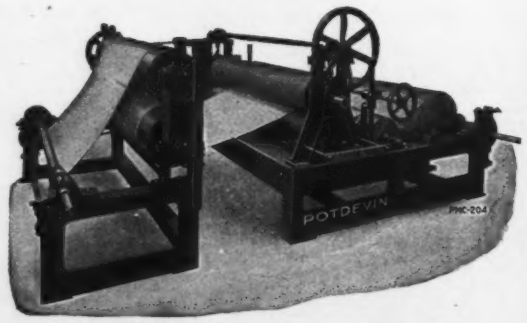

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course of the cook, and thus locate the various reagents at all times.

Operation

The digester was filled full of wood for each cook. The actual weight of wood used in each cook is shown in the tabulation in Fig. 2.

After charging with wood the head was bolted on without closing the blow-off valve, and live steam passed through the chips from the top for half an hour. Studies of the moisture content of wood at various temperatures and humidities by the kiln drying section of the Forest Products Laboratory have shown that under the conditions of steaming the wood approaches a constant moisture content of 22 per cent when at equilibrium. This figure was used in all calculations in which volume of digester content was a variable.

When the steaming was completed the blow-off valve was closed and the acid run in immediately until the digester was completely filled. It was then allowed to stand over night. When starting the cook on the following morning, enough acid was run in to make up for the amount that had soaked into the chips over night, and completely fill the digester again. The quantities used are shown in Fig. 2.

The heating was carried out entirely with indirect steam by means of the coil. The temperature was raised to one hundred degrees centigrade in three hours, one hundred and forty-five degrees centigrade in eight and one-half hours, and held at that point to the finish. The pressure was not allowed to exceed sixty-five pounds per square inch. All cooks were made following the same temperature curve, and the premature blows were made at all the intervals at which samples were drawn, except the fourth hour.

During the cooks samples of liquor were drawn at the 4th, 7th, 9th, 10th, 11th, 11½, 12th, 12½ and 13¼ hours, and the analytical data are from the examination of these samples. The data from which the curves were drawn are averages of all analytical results. The contents of the relief receiver and of the gas-absorbing tank were also examined at the end of each cook.

The pulp from the seven-hour cook was not run into a sheet, as it was but little different from wood. The pulp from the nine-hour cook was beaten for an hour before running over the paper machine. This was necessary to make it screenable through .012 plates. In all the other cooks the pulp was taken from the blow pit, screened through .016 plates, run over a small wet machine and sampled for analysis, yield, bleach, and ball mill strength tests.

Materials

The wood used in this series of cooks was white spruce, cut near Rib Lake in northern Wisconsin during July or August, 1921. After barking and chipping to chips ⅝ths of an inch long it was sorted by hand and oversize and sawdust that passed a quarter inch screen removed; the knots were also removed.

The acid was made using a commercial hydrated lime prepared for chemical manufacturing purposes, and containing 98 per cent calcium hydrate. Sulphur dioxide from cylinders of liquid sulphur dioxide was passed into a suspension of the hydrate until the desired strength of acid was obtained.

The acid used had about the following composition in all cooks: 3.80 per cent total SO_2, 2.40 per cent free SO_2, and 1.40 per cent combined SO_2. See Fig. 2.

Analytical Data

The analytical data obtained on the liquor at intervals during the cook and upon the pulp produced in each cook include the following:

Total, free and combined sulphur dioxide by adaptation of the method of A. Sander[4]

Total sulphur dioxide by iodine titration.

Loosely combined or reversible sulphur dioxide according to Klason.[5]

Lignin in the pulp.

Total calcium.

Ash in pulp.

Cellulose in the pulp.

Total, free and combined sulphur dioxide are used in their usual significance. The determination will be taken up again in the discussion of results.

Total sulphur dioxide by iodine titration was carried out in the usual manner, using N/16 iodine solution with starch indicator.

In carrying out the determination of loosely combined sulphur dioxide according to Klason, the solution was allowed to stand half an hour in all cases before completing the titration.

Lignin in the pulp was determined as matter insoluble in 72 per cent sulphuric acid, according to the method of Konig and Rump[6] used in this laboratory.

Total calcium in the liquor was determined by fuming a sample with nitric and sulphuric acids until a pale yellow solution was obtained that did not darken when heated to the point at which fumes of sulphur trioxide were given off. In the solution obtained after dilution the calcium was precipitated as calcium oxalate and after filtering, the precipitate was dissolved and the oxalic acid titrated with permanganate solution.

The ash was obtained by ashing a quantity of the pulp in porcelain in electric furnace.

Cellulose in the pulp was carried out according to the Cross and Bevan[7] method in use in this laboratory.

The table, Fig. 2, includes the data covering the yield, cooking data and tests of strength by the ball mill method.

In the curves of analytical data the results are in all cases expressed in terms of grams of the material determined in the total digester contents, except that for lignin, which is in terms of per cent of the lignin content of the wood that had been removed. To obtain these figures the amount of liquor withdrawn in sampling and the amount of liquor in the relief receiver at the time of sampling were deducted from the original quantity of liquor in the digester and the analytical results calculated to the corrected volume.

In the case of the calculated results, that for inorganic combined calcium is calculated from the combined sulphur dioxide determined by the Sander method, and the organic combined calcium is the difference between the total and the inorganic combined calcium.

Organic combined sulphur dioxide is that which remains when from the amount of sulphur dioxide present at the beginning of the cook there is deducted the sulphur dioxide in the gas-absorbing tank, that in the condensed relief receiver, that in the samples withdrawn, the loosely combined sulphur dioxide, and the sulphur dioxide titratable with iodine at the end of the cook. In other words, all sulphur dioxide not determined in some other form is calculated as organic combined sulphur.

The Sander reaction or method for determining the SO_2 content of a cooking liquor as used in this study is an adaptation of that described by A. Sander in a recent publication.[8] Several series of titrations were run, comparing the analytical method based on the Sander reaction with the Winkler method of titrating with iodine and alakli, using phenolphthalein as indicator as commonly used in the testing of cooking liquors in mill operation. For the comparison a solution of calcium bisulphite and sulphurous acid made from pure chemicals was analyzed by both methods, and also by evolution of sulphur dioxide and precipitation of calcium, as calcium oxalate and titration of the dissolved precipitate with standard postassium permanganate solution. It was found that the two methods gave the following results using CO_2 free soda solution:

[4] Paper Trade Journal, LXXXI, No. 10, Sept., 1920.

[5] Paper, Volume 23, No. 13.

[6] Jour. Ind. and Eng. Chem., 9 page 556 (1917).

[7] Jour. Ind. & Eng. Chem. 9, page 556 (1917).

[8] Loc. cit.

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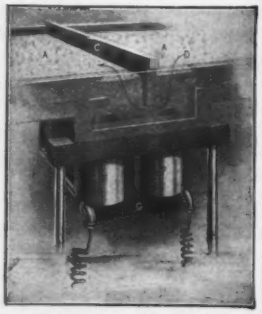

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Comparative Results

Evolution and precipitation		Winkler. Average of 6 trials	Sander Average of 6 trials
Total SO_2.....	4.39	4.39	4.30
Free SO_2.....	3.04	3.03	3.02
Combined SO_2.....	1.35	1.36	1.28

It was also noted that the presence of CO_2 in the titrating solution or the cooking liquor, while it had an appreciable effect on the titration by the Winkler method, using phenolphthalein indicator, was without effect on that by the Sander method when in the concentrations likely to be encountered in technical work in the mill laboratories.

When applied to the titration of the liquor at intervals during the cook the method of Winkler is of no value, as has long been known. The error in the alkali titration by the Winkler method has been attributed to the presence of organic acids which caused the value for free SO_2 by alkali titration to exceed the value for total SO_2 by the iodine titration in the later stages of the cook. No measure of the combined SO_2 was possible, therefore. The application of the Sander reaction, however, makes it possible to measure the concentration of combined SO_2 at all stages of the cook.

Application of Sander Method

The Sander reaction as used in these studies is applied as follows: A two cubic centimeter sample of the liquor, either fresh cooking liquor or liquor drawn from the digester, is diluted to about one hundred cubic centimeters with distilled water, and titrated with N/8 sodium hydroxide solution, using methyl orange as the indicator. When neutral, according to the change in methyl orange, an excess of a saturated solution of mercuric chloride is added upon which the contents of the titrating flask become acid again. Titration is then continued until once more neutral to methyl orange. Four times the second titration gives the per cent total SO_2. Twice the difference between the second and first gives the per cent combined SO_2.

In the first titration all the SO_2 present as excess sulphurous acid is converted to bisulphite, so that all SO_2 present in the solution when the first neutral point is reached is in the form of bisulphite. The addition of mercuric chloride to this solution brings about the formation of a complex addition product to which A. Sander assigns the formula,

$Ca(HgCl\ SO_3)_2$, and liberates one molecule of hydrochloric acid for each (HSO_3) ion present.

The reactions are as follows:

First titration—

$H_2SO_3 + Ca(HSO_3)_2 + NaOH \rightarrow NaHSO_3 + Ca(HSO_3)_2 + H_2O$. Addition of $HgCl_2$.

$NaHSO_3 + Ca(HSO_3)_2 + 3HgCl_2 \rightarrow NaHgClSO_3 + HCl + Ca(HgClSO_3)_2 + 2HCl$.

This liberated hydrochloric acid is titrated in the second tiration and is an indirect measure of the total SO_2 present. The difference between the first and second titrations is a measure of the amount of bisulphite originally present in the solution and, therefore, an indirect measure of the combined SO_2. The difference between the total and combined then gives the value for free SO_2.

It was discovered early in the study that there was a discrepancy in the concentration of total SO_2 as measured by the two methods in the cooking liquor at different stages in the cook. The total by the iodine titration (see Fig. 3) being invariably lower than that by the Sander method, but in varying amount. Consideration of the loosely combined or reversible SO_2 content of the liquor suggested a connection that was tested as follows:

In the ordinary determination of reversible SO_2 after titration with iodine, decolorizing and making alkaline, the solution was allowed to stand half an hour before acidifying and titrating the reversible SO_2. It was found that if the solution without previous titration with iodine was made alkaline, allowed to stand half an hour, and then acidified and titrated with iodine, the value obtained was equal to the sum of the total SO_2 and reversible SO_2 obtained by the ordinary manipulation. Also, if the solution was titrated with alkali to neutrality, using phenolphthalein as the indicator, and then acidified with HCl and titrated with iodine the value for SO_2 obtained approached the sum of the total SO_2 and reversible SO_2 by the ordinary manipulation. It appears then that the titration with alkali determines not only the free SO_2 but the reversible SO_2 in part also and the more slowly the titration is carried out the more completely the reversible SO_2 is split off and titrated.

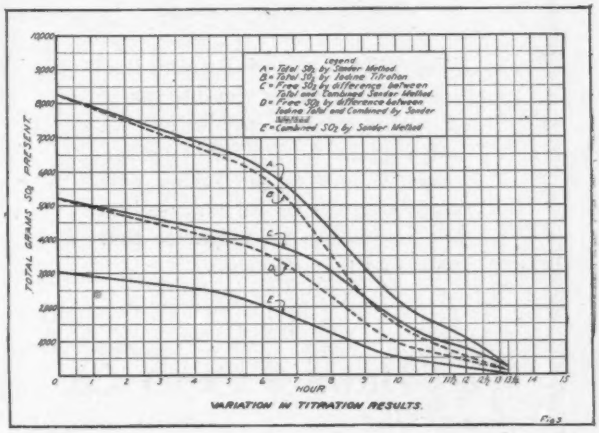
Legend
A= Total SO2 by Sander Method
B= Total SO2 by Iodine Titration
C= Free SO2 by difference between Total and Combined Sander Method.
D= Free SO2 by difference between Iodine Total and Combined by Sander Method
E= Combined SO2 by Sander Method
TOTAL GRAMS SO2 PRESENT
HOUR
VARIATION IN TITRATION RESULTS.

FIG. 3.

The following table shows the relations discussed and are taken from the control analyses of a recent cook:

RELATIONS BETWEEN ALKALI TITRATION, IODINE TITRATION AND REVERSIBLE SO_2.

Hours	Sander Method: Comb. %	Free %	Total %	Sum. of Iodine total and reversible SO_2 %	Iodine, total %	Reversible SO_2 %
4	1.02	3.42	4.44	4.46	4.36	0.10
7	.68	3.20	3.88	3.87	3.62	0.25
9	.58	3.02	3.60	3.40	3.18	0.32
10½	.34	2.62	2.96	2.98	2.64	0.34
11½	.30	1.86	2.16	2.07	1.71	0.36
12	.14	.74	.88	.91	0.45	0.46
12¼	.10	.54	.64	.61	0.21	0.40

The values for the alkali titration in the Sander method when applied to samples from the digester then are too high by an amount approaching the reversible SO_2 content of the liquor. This, however, does not introduce an error into the determination of combined SO_2 because the same error is present in both titrations by the Sander method and the value for combined SO_2 being derived from the difference between the two is unaffected.

The true values for the concentration of SO_2 in its various forms of combination are obtained by taking the iodine titration as a measure of the total SO_2,* the combined SO_2 by the Sander method as the measure of the combined SO_2 and the difference between them as the true free SO_2. These values are those from which the curves in Fig. 7 were drawn.

The test of physical properties of the pulps produced in these cooks are shown in table, Fig. 2, together with the data on acid

* Klason in "Beitrage Zur Kenntniss der Chemischen Zusammensetzung der Fichtenholz" (Contribution to the Knowledge of the Chemical Composition of Spruce Wood). Notes that one molecule of SO_2 is so loosely combined with organic matter that it may be partially titrated with iodine at ordinary temperatures. This accounts for the irregular end point in titrating liquor at the end of the cook.

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strength and quantity, and amount and condition of the wood used in each cook.

The cook blown at the seventh hour was in no sense pulp. While there was much evidence of cooking action in that the wood was lighter in color and somewhat softened, the chips were not disintegrated. That blown at the ninth hour was much disintegrated and the chips had lost their form. It was not screenable, however, and required some beating before it could be run into a sheet. That blown at the tenth hour was pulp and the disintegration had proceeded so far that the pulp could be screened and run into a sheet. The pulp at this hour was the strongest produced in the series, being equal in strength to good Mitscherlich pulp. It was not of good color, however, and the sheet while strong had a harsh appearance and feel.

The cook blown at the eleventh hour was the best of the series in point of color, approaching but not equaling the color of good commercial sulphite. In point of strength it was but little inferior to the cook blown at the tenth hour and much superior to it in general appearance and feel. The cooks from the eleventh hour on were irregular in color and inferior in all respects to the one blown at the eleventh hour, culminating in the cook blown in thirteen and one-quarter hours, which was burned and decidedly an inferior product. The cook blown in twelve hours has a maximum strength equal to the one blown in eleven hours, but this maximum is a peak in the curve maintained for but one reading, and was not checked for lack of material.

In considering the anlytical data in the light of the pulp produced the most outstanding feature is that the marked change in the chemical composition of the liquor ceased at or about the same time that the pulp of most superior quality was produced, and at the same time the marked change in chemical composition of the pulp ceased. In general, the action after the eleventh hour was to the detriment of the pulp. The conclusion to be drawn is that for this strength of acid and the temperature and pressure employed the cooking was complete at some instant at or about the eleventh hour.

The results of the study of the location or state of combination of the base, Fig. 4, present some interesting features. The rate of change in the curves representing both the amount and concentration of base present in inorganic combination decreases markedly at or about the same time that the pulp reaches its maximum quality.

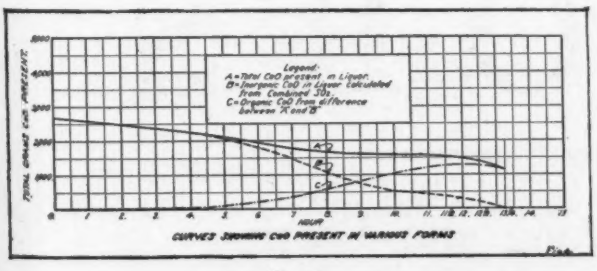
Legend.
A=Total CaO present in Liquor.
B=Inorganic CaO in Liquor Calculated from Combined SO2
C=Organic CaO from difference between A and B
HOUR
CURVES SHOWING CaO PRESENT IN VARIOUS FORMS

FIG. 4.

Only by blowing gas vigorously as was done in the cook blown at thirteen and one-quarter hours was it possible to greatly reduce the amount of inorganic combined base. The reaction involving combination of base, then, ceased at or about the same time that the pulp was at its best.

The curve representing the total base present in the solution follows a downward course to an approximate level, but its conformation does not appear to be related to the nature of the pulp. That it should decline at all may occasion surprise, as there was only a small amount leaving the digester in the relief. That it does decline leads to the conclusion that it must be localized in some manner such that it is removed from the liquor of which the sample drawn is representative. Such removal can be understood if it is assumed that it is in some way attached to or collected around the fibers and an examination[18] of the pulp ash confirms this assumption.

ASH CONTENT OF PULPS

Hour	7	9	10	11	11½	12	12½	13¼
% Ash	2.17	2.71	2.12	1.08	1.21	1.08	1.00	1.95
% CaO	1.25	1.17	0.74	0.35	0.38	0.34	0.26	0.64

ASH CONTENT OF PAPERS

Hour	11½	12	12½	13¼
% Ash	0.67	0.80	0.74	1.04
% CaO	0.22	0.25	0.22	0.29

Whether or not it is combined with or absorbed onto or precipitated upon the fibers has not been proved, but examination of the analytical data indicates that it is precipitation in part at least. If it were combined with the fiber or undissolved organic matter still attached to the fiber, a greater regularity of ash content would be expected, and further, the operation of running the sheet of paper should not remove it, as is indicated by comparison of the ash content of the pulp and the paper made from it. The base unaccounted for is probably deposited on the heating coils or lost in washing the pulp (table, Fig. 5).

FIG 5. LOCATION OF BASE

Cook No.	630-I	629-I	626-I	625-I	634-I	633-I	631-I	632-I
Total added CaO grams.	2,768	2,675	2,518	2,715	2,680	2,662	2,621	2,700
CaO found in liquor grams	1,727	1,562	1,568	1,437	1,586	1,482	1,592	1,150
CaO found in pulp grams	421	334	214	82	87	78	61	136
CaO unaccounted for grams	620	780	737	1,197	1,007	1,103	969	1,414

The curve for organic combined base is obtained by subtracting the inorganic combined base calculated from the combined SO_2 from the total base determined in the liquor and shows again that after the eleventh hour no further appreciable amount of combination of base takes place.

The curve for the rate of removal of lignin, Fig. 6, is interesting

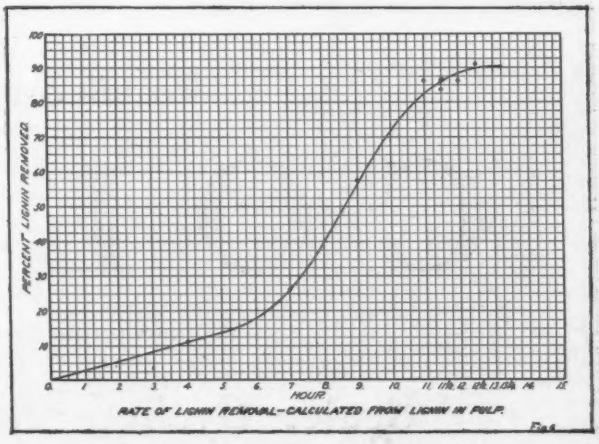

FIG. 6.

in that it throws a somewhat different light on the common view of the course of this fundamental action. The view is commonly held that the cooking action takes place in greatest amount near the end of the cook. The data upon which the curve is based, however, show that the action that removes the lignin has made some progress before the fourth hour and 110° C. has been reached, attains a considerable speed at temperatures but little above one hundred degrees Centigrade, and proceeds with vigor through all temperatures that are commonly thought of as intermediate. It will be noted also that at the point at which the best pulp was obtained there is a slackening of the action and that after the elev-

[18]Similar work by Dr. C. G. Schwalbe—Zell u. Papier, i, 11 (1921).

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enth hour the irregularity of the data does not justify any conclusion that lignin removing action took place. The decreased rate of reaction will be discussed later in this paper. It is noteworthy also that at the eleventh hour, the hour at which the best pulp was obtained, the lignin content is in close agreement with the lignin content of strong Mitscherlich pulp, viz., 7.56 per cent. See table, Fig. 10.

The curves representing the amount of sulphur dioxide present in various states of combination are given in Fig. 7. The curves in Fig. 8 represent the concentration of total, free, and combined SO_2 as determined by the Sander method, and also the temperatures and pressures during the cook. Fig. 8 is in fact a reproduction of the cooking record of the cook blown at thirteen and one-quarter hours.

In these curves the approach to a constant value is not as close as in the case of the curves previously discussed, but it should be remembered that the values for sulphur dioxide are being changed by the relief. They do, however, show a marked change in rate of variation and allowing for the effect of relief the approach to a constant value is near enough to suggest that in the case of the total, free, and combined sulphur dioxide there is little pulping action in which they are concerned after the eleventh hour.

The curve for the loosely combined sulphur dioxide values shows decline after reaching a maximum at eleven and one-half hours, suggesting a decomposition and liberation of SO_2 in the later stages of the cook.

The curve representing the organic combined sulphur shows a rapid increase over the same periods during which a rapid removal of lignin was taking place, but unlike the other values it does not reach an approximately maximum until the end of the cook. This suggests that while the action which removes the lignin from the wood may come to a stop at or about the eleventh hour, the reaction of sulfonation may continue upon the lignin already removed.

FIG. 9
ANALYSIS OF PULPS

Cook No.....	630	629	626	625	634	633	631	632	636
Cellulose %...	62.0	73.10	76.95	85.77	87.38	87.97	92.60	89.92	94.35
Lignin %.....	25.85	16.55	16.55	7.56	9.11	7.36	5.06	6.28	1.76

The cellulose and lignin content of the pulps produced at the

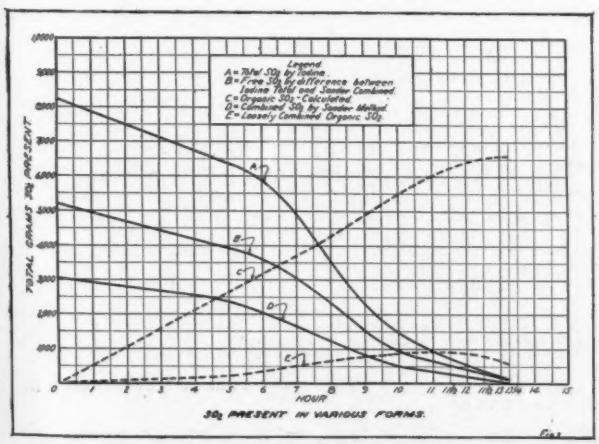
Legend
A=Total SO2 by Iodine
B=Free SO2 by difference between Iodine Total and Sander Combined
C=Organic SO2 - Calculated.
D=Combined SO2 by Sander Method
E=Loosely Combined Organic SO2
TOTAL GRAMS SO2 PRESENT
HOUR
SO2 PRESENT IN VARIOUS FORMS.

FIG. 7.

various intervals is shown in the above table (Fig. 9).[11] It will be noted that there is relatively little change in the composition of the pulp and a tendency toward irregularity after the eleventh hour. That the change should be of the order shown is further confirmation of the conclusion that there is little cooking action after the eleventh hour, and that the action which does take place has a tendency to injure the pulp and may be entirely secondary to the real cooking action.

[11]Data on composition of pulps supplied by M. W. Bray of this laboratory being part of data to appear later in publication of results of the Study of the Chemistry of Pulps by M. W. Bray and others.

The carrying out of this preliminary series of cooks has demonstrated the value of two reactions as indicators of the progress of the cook, viz., the Sander reaction and the loosely combined SO_2 determination.

The Sander reaction or method gives for the first time a convenient method for determining the rate of exhaustion of the cooking acid at all times in the cook, giving as it does, close measure of the concentration of combined sulphur dioxide. It indicates with certainty the approach of the time when a digester must be blown

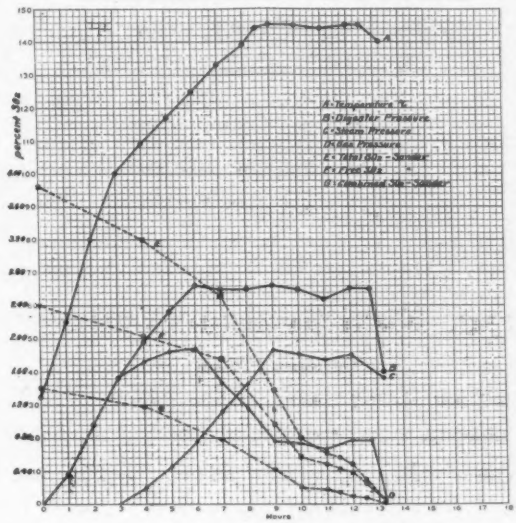

FIG. 8.

to avoid burning. Taken in connection with the iodine titration it gives a true measure of the concentration of total, free and combined sulphur dioxide.

The amount of loosely combined sulphur dioxide has a close connection with the rate of solution of that material described as lignin. Bearing as it does a close relation to the difference between the total sulphur dioxide as determined by the Sander method and iodine titration, its approximate value can be quickly determined. The numerical value of the determination is of less importance than its rate of change. When the value becomes constant, it does not indicate that good pulp will be obtained on blowing, but it does show that the point has been reached beyond which further cooking will not greatly improve the pulp.

The application of these reactions in the mill will be of less value as control methods than as means of determining the location of defects in cooking method, but in this latter connection they should be of great value.

Considering the series and associated analytical data as a whole, the general impression or broad conclusion is that under the conditions of the series, a pulp that would be equivalent in all respects to commercial pulp could not be made. The question arises, "In what respect was the combination of temperature, pressure, acid strength, acid composition at fault?" That it is the combination is readily understood when it is considered that no one factor considered alone is responsible for the shortcomings of the pulp.

If the data be examined, one is at once struck by the abrupt change in the rate of reaction at about the eleventh hour. Conditions prevailing just before and just after are not very different, yet the rate of change is much different. The analytical data on the pulps, Fig. 9, show that while the removal of lignin nearly ceases at the eleventh hour, yet a pulp of high purity has not been produced. Commercial pulps of good quality will give about 94 per at the eleventh hour, yet a pulp of high purity has not been pro-

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FIGURE 10
ANALYSIS OF COMMERCIAL PULPS

Sample No.	Lignin %	Cellulose %
S 31	6.19	94.23
S 33	7.04	94.60
S 34	5.17	95.30

From this information it was concluded that the acid strength and composition after the eleventh hour were not capable of maintaining the reaction, either because of the residual materials being more

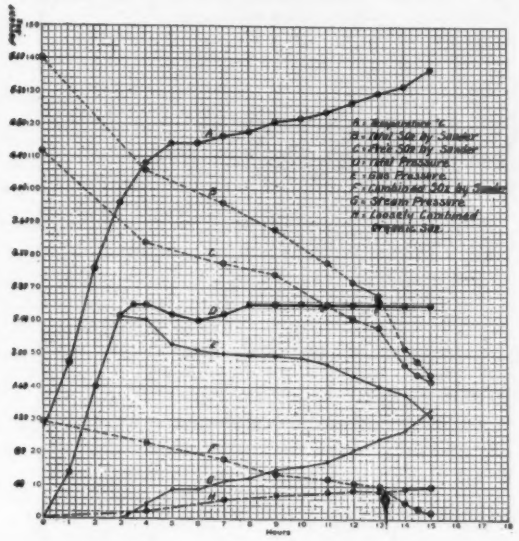

FIG. 11.

difficult to remove or because of the completion of the reaction that the acid of the then composition and strength was capable of maintaining, or because the decrease in amount of material to be removed brought about an apparent stoppage of the reaction. That the reaction that had stopped was not sulfonation was suggested by the continued rise in the curve for organic combined sulphur. The action of hydrolysis remains and to determine if making the conditions for continued hydrolysis more favorable would produce a pulp with purer cellulose and better color and greater bleachability, a supplementary cook was made. In this cook the acid composition was: Total, 5.60 per cent; free, 4.46 per cent, and combined, 1.14 per cent. The increase in free was to increase the possibility of hydrolytic reaction. To maintain, therefore, the advantage of a high free SO_2 content, a temperature curve was selected such that there would be little necessity for relief and consequent exhausting of the acid when a maximum pressure of sixty-five pounds per square inch was maintained. This curve called for a rise to one hundred degrees centigrade in three hours and a rise not exceeding three degrees an hour thereafter,—curve, Fig. 11. Decision to blow was based on: 1. The Sander reaction showing a very low concentration of combined SO_2. 2. The loosely combined sulphur reaction showing that a maximum value had been reached. 3. The color of the liquor which was that of a liquor from a well cooked commercial cook. The cook was blown after fifteen hours at a maximum temperature of one hundred and thirty-seven degrees centigrade. The data on the pulp produced is that for cook 636-I, and it will be noted that the cellulose content has increased, the lignin content has decreased, the pulp is much more readily bleachable and the strength is but little impaired. The color also was excellent. Its cellulose and lignin content compare favorably with an easy bleaching Mitscherlich pulp of commercial origin, viz., cellulose 96.05 per cent, lignin 1.62 per cent.

The success of this experiment seems to justify the conclusion that while sulfonation may be an essential part of the reaction or reactions producing pulp from wood by the sulphite process, it is of greater importance from the standpoint of the commercial value of the pulp to maintain at the finish of the cook conditions favorable to hydrolytic reactions, namely, a high concentration of free sulphurous acid.

Summary

1. A method of procedure for the study of the chemistry of the sulphite process has been tested and found to be workable.
2. Methods of analysis have been tested and applied to the preliminary study.
3. The application of two hitherto little used methods, the Sander reaction and reversible sulphur dioxide determination, to the control of a sulphite cook have been tested and found of value.
4. Information as to the character of pulp produced at different stages in a sulphite cook has been secured.
5. The importance of the content of free sulphurous acid at the end of the cook has been pointed out.

Report of Committee on Beater Furnish

Report to Annual Meeting of Technical Association by Justus C. Sanburn, Chairman.

The Cost Association's Committee on Beater Furnish was formed early last summer. The Committee from the Technical Association, which was to co-operate with the Cost Association, was then completed, appointing men from the same companies as far as possible.

As the result of several meetings of the members in the Holyoke district, a preliminary report covering the technical side of the problem was made. This report is now in the hands of the Cost Association committee for the addition of cost data. When finished, the report will be sent to all the members of both committees for criticisms and additions. A final report will then be published.

The work of the Cost Committee has unfortunately been hampered by the resignation of its chairman, C. A. Jones, who has left the paper industry. Henry F. Miller of the American Writing Paper Company was appointed to succeed him.

BUSINESS IN CHICAGO UNSTEADY

The trend of paper purchases in Chicago has shown little material change during the past week or two. "We are doing what I would call a spotty business," one mill representative told the PAPER TRADE JOURNAL. "Business could be a whole lot better, but at the same time it could be a lot worse. There is nothing very steady about the manner in which orders are being placed, but there are some signs which have a leaning toward better business in the near future."

This interview seems to be the general consensus here. Most members of the trade are doing a fairly good business, which is reported spasmodic and with strengthening tendencies.

Buyers are said to be a little freer in their ordering than they have been in the past. The feeling that prices will be reduced without notice is felt to be gradually wearing away. This attitude has been one of the big factors which the local paper salesmen have been up against, especially they who are handling the large deals.

Jobbers' salesmen, covering local consumer and printing plants say that their business is very spotty. One salesman this week said, "I've had three very good days. But before the week is up I might run into a couple of days when I can't pick up one single order. That is the way things have been running. For two or three days I will not get a single order, and then suddenly a couple of good days will start in and stop just as they started."

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Report of Committee on Standard Methods of Testing Materials Used in the Pulp and Paper Industry

Report to the Annual Meeting of the Technical Association by F. Becker, Chairman

1. Your Committee on Standard Methods of Testing Materials found that in the past several analytical and testing methods had been proposed. Sufficient work, however, had not been done to determine the practicability and accuracy of these methods, in order to accept same as standards of the pulp and paper industry.

Your committee, therefore, undertook an investigation of these previous proposed testing methods. Besides this an extensive investigation was made of the color effect of Rosin Size Emulsion on finished product. Also, your committee investigated specifications for lime for use in causticizing, proposed by the Bureau of Standards.

II. A few committee members reported that they were not able to assist in the work, but I was successful in getting Miss Helen U. Kiely, of the American Writing Paper Company, and C. H. Kent, of the Paper Makers' Chemical Company, to serve on the committee. Miss Kiely has been of a particular value to the committee, as she had assisted the former chairman, Mr. Tucker, in drawing up the testing methods proposed at last year's meeting, and which are the methods which your committee have had under investigation.

Your committee was subdivided as follows:

James E. Alexander, *Aluminum Sulphate*, as proposed in last year's meeting to be reported on by Miss Kiely. George R. Atkinson, *Soda Ash and Lime*. To be reported on by Mr. Atkinson.

III. Bjarne Johnson, *Determination of Acidity of Aluminum Salts*. As proposed at last year's meeting, to be reported on by Miss Kiely. C. H. Kent, *Color Effect of Rosin Size Emulsion on Finished Product*. Proposed by Mr. Kent and myself, to be reported on by Mr. Kent. Miss Helen U. Kiely, *Crown Filler*. As proposed at last year's meeting, to be reported on by Miss Kiely. Also specifications for lime for use in causticizing, as proposed by the Bureau of Standards in co-operation with the Interdepartmental Conference on Chemical Lime.

IV. Standard samples of the above mentioned materials were sent to a member of Pulp and Paper Mill Laboratories, with the proposed testing methods attached. The results of this analyisis, and comments on the methods, were collected, and will be reported on by the various committee members.

This committee is satisfied that the above mentioned methods are now in such shape that it can safely recommend same to be adopted as standard, and trust that it may have the support of the T. A. P. P. I.

Aluminum Sulphate

Last year at the Technical Association meeting, methods were proposed for analysis of various materials used in the pulp and paper industry. These methods were not adopted at that session as sufficient data was not represented to ascertain their suitability. It was decided at that time to have various methods tested by various chemists and if the methods proved satisfactory to have them adopted as the standard methods of the T. A. P. P. I.

The method proposed for the analysis of aluminum sulphate has been tested by six laboratories. The results obtained warrant the adoption of this method as a standard with the following corrections. These corrections are not fundamental but rather in manipulative detail.

1. It has not been found necessary to add tannin to coagulate the aluminum hydroxide when precipitated with ammonia.

2. The double precipitation of alum is not necessary as the impurities occluded would be negligible.

3. The determination of sulphates in alum is unnecessary. This may better be calculated from the aluminum determination.

4. As the Jones Reductor is often not available the reduction of the iron by means of stannous chloride with additions of mercuric chloride and manganese sulphate is recommended as an alternative method. This method is given in detail below.

Dissolve 5 gr. of the alum in 100 cc. water in a 600 cc. beaker. Bring the solution to boiling and add 3 or 4 drops of stannous chloride solution (1).

Cool rapidly and dilute with about 400 cc. dist. water. Add 15 cc. saturated mercuric chloride solution (2).

The stannous chloride reduces the ferric-ions to ferrous and the mercuric chloride oxidizes the excess stannous to stannic-ions.

The iron, now present in the solution in the form of ferrous-sulphate, is determined by titration with N/10 permanganate solution after the adding of 10 cc. manganese sulphate solution (3).

Calculation: Number of cc. N/10$KMNO_4$ $\times$ 0.008/5 = % Fe_2O_3.

(1) *Stannous Chloride.* Dissolve 250 gr. $SnCl_2$ in 200 cc. conc. HCl and dilute to 2 liters.

(2) *Mercuric Chloride.* Saturated solution of $HgCl_2$.

(3) *Manganese Sulphate.* Dissolve 67 gr. of manganese sulphate — $MnSO_4$ — $4H_2O$) in 500 cc. water; add 138 cc. phosphoric acid and 130 cc. conc. H_2SO_4 and dilute to 1000 cc.

NOTE: If, after the adding of mercuric chloride, the solution turns gray of reduced mercury, repeat the analysis because this indicates that too much stannous chloride has been used.

The volumetric method for the determination of combined alumina is recommended where determinations are made daily. The preparation of reagents for an occasional analysis makes this method impracticable. The method as tested proved very satisfactory for routine testing.

Method of Basicity or Acidity in Alum

The potassium fluoride method for determination of basicity or acidity of aluminum salts as presented last year has been tried out and very good results obtained. No other method tested gave any satisfaction. It is recommended that this method be adopted as proposed.

NOTE: It might be well to add a blank should be run on the potassium fluoride if the solution is not absolutely neutral.

The following data shows actual tests run by three different chemists, using this method, with very close results:

	1.	2.	3.
Sample No. 1—Free Al_2O_3	.39	.46	.49
Sample No. 2—Free Al_2O_3	.19	.23	.23
Sample No. 3—Free H_2SO_4	2.57	2.71	2.74

The following laboratories co-operated in the work on a standard method for aluminum sulphate:

Kalamazoo Vegetable Parchment Company, Kalamazoo, Mich.
Lee Paper Company, Vicksburg, Mich.
Ohio Boxboard Company, Cleveland, Ohio.
Westfield River Paper Company, Russell, Mass.
Hammermill Paper Company, Erie, Pa.
Hamersley Manufacturing Company, Garfield, N. J.
American Writing Paper Company, Holyoke, Mass.

Determination of Basicity or Acidity of Aluminum Salts

The procedure is based upon the fact that an excess of neutral potassium fluoride decomposes aluminum salts in solution, forming two stable compounds which react neutral to phenolphthalein, while

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the free acid remains unaltered, the following reaction taking place:

$Al_2(SO_4)_3 \cdot 12KF \times H_2SO_4 = 2AlF_{3.3}KF \cdot K_2SO_4 \times H_2SO_4$.

The precipitate $AlF_{3.3}KF$ is insoluble in an excess of the potassium fluoride reagent, and is not appreciably attacked by acids or alkalies. Theoretically about 7 parts by weight of potassium fluoride are required for one part by weight of aluminum sulphate, but in actual practice it is advisable to use twice this amount.

Reagents Required—Standard solutions of sulphuric acid and potassium hydroxide. Half normal solutions have been found to be of suitable strength. Sodium hydroxide may be used in place of the potassium hydroxide.

Phenolphthalein Indicator.—Alcoholic solution containing 0.1 per cent of the reagent.

Potassium Fluoride.—The reagent may be prepared by dissolving 1,000 grams of potassium fluoride in 1,200 cc. of hot, CO_2-free water, then neutralizing the solution with alkali or hydrofluoric acid as the case may require, using 5 cc. of phenolphthalein indicator. Dilute sulphuric acid may be used in place of hydrofluoric acid, in the final adjustment, to get a neutral product; 1 cc. of the solution in 10 cc. of CO_2-free water should appear a faint pink. The concentrated mix is filtered if necessary and then diluted to 2,000 cc. with CO_2-free water. The gravity will now be approximately 1.32 (about 35° Bé.): 1 cc. contains 0.5 g. potassium fluoride salt.

Method of Procedure

Solids.—3.4067 grams of the finely ground sample or an equivalent amount in solution (100 cc. sample containing 34.067 grams per liter) are taken for analysis. The powder is dissolved by boiling with 100 cc. of distilled water in a four-inch casserole with clock glass cover. To the hot solution 10 cc. of N/2 H_2SO_4 are added, and after cooling to room temperature (20° C.) 18 to 20 cc. of the potassium fluoride reagent are added and ½ cc. of phenolphthalein indicator. The solution is now titrated with N/2KOH, added drop by drop until a delicate color, persisting for one minute, is obtained. This titration shows whether the product is basic or acid.

Basic Alumina.—This is indicated when the alkali back titration is less than the amount of acid added. Free Al_2O_3 = (cc. H_2SO_4 − cc. KOH ÷ 4.

Free Acid.—In this case the back titration of the alkali is greater than the cc. of acid added. Free acid = (cc. KOH − cc. H_2SO_4) × 0.72.

Liquors.—In works control of liquors the specific gravity is taken: 5 cc. are diluted to 100 cc. with CO_2-free water, 10 cc. of N/2 H_2SO_4 added and the solution boiled for about five minutes. After cooling, the potassium fluoride reagent is added, together with phenolphthalein and the titration with the standard alkali made as in case of solids.

Basic Mixes—(Cc. H_2SO_4 − cc. KOH) × 0.0245 × 0.3473 × 100) ÷ (5 sp. gr.) = free Al_2O_3.

Acid Mixes—(Cc. KOH − cc. H_2SO_4 × 2.45) ÷ wt. of sample = free H_2SO_4.

Neutral Mixes—The back titration of the alkali is the same as the volume of the acid added.

Note—CO_2-free water must always be used in titrations with phenolphthalein indicator. This may be obtained by boiling distilled water to expel CO_2.

Lime for Causticizing

The attached specifications for lime for use in causticizing have been tried out and work entirely satisfactory. The proposed method for available lime has been tested against several alternative methods for lime and has proved very accurate, quick and simple to run. In view of the fact that this method has been adopted by the Bureau of Standards in co-operation with the interdepartmental conference on chemical lines, it is recommended that the T. A. P. P. I. adopt it as their official method.

1. General.

(a) Definition of Lime.—Lime is the product resulting from the calcination of limestone. It will slake when water is added to it, and this slaking is accompanied by an evolution of heat, an increase of volume, and the formation of calcium hydroxide.

(b) Use of Lime in Causticizing.—Lime is added to solution containing alkali carbonates for the purpose of forming the corresponding hydroxides, or caustic alkalies. These remain in solution, while calcium carbonate is precipitated. The solution and precipitate are separated; the solution is concentrated by evaporation to the extent desired for the object in view, and the calcium carbonate sludge is either converted in lime or discarded.

(c) Quality.—The impurities ordinarily found in lime, and which include underburned and overburned lime, retard the slaking process. They also increase the volume of the sludge, which then either requires more time in washing or carries off more inclosed caustic alkali. Magnesium compounds do not settle either quickly or well in the solution of caustic. The presence of any impurities thus introduces delays which reduce the efficiency of the equipment.

(d) Packing.—Quicklime is shipped either in bulk or in carload lots, or in barrels holding 180 to 280 pounds net each.

2. Requirements.

(b) Composition.—The standard of composition for quicklime for use in causticizing shall be a content of 85 per cent of available lime.[1] Lime containing more than 3 per cent magnesia or less than 70 per cent of available lime shall be rejected as uneconomical in use.

All percentages enumerated herein are based on the weight of the sample as received at the laboratory.

(c) Marking.—Each carload of material or fraction thereof shall be legibly marked with the names of the consignor and consignee and with some means of identifying the particular contract on which the shipment is made. This information is in addition to that requred by the federal lime barrel law.

(d) Retesting.—Notice of the rejection of a shipment based on these specifications must be in the hands of the consignor within ten days after the receipt of the shipment at the point of destination. If the consignor desires a retest, he shall notify the consignee within five days of receipt of the notice of rejection. The consignee shall provide all reasonable facilities to permit the consignor to resample the material. The retest shall be at the expense of the consignor.

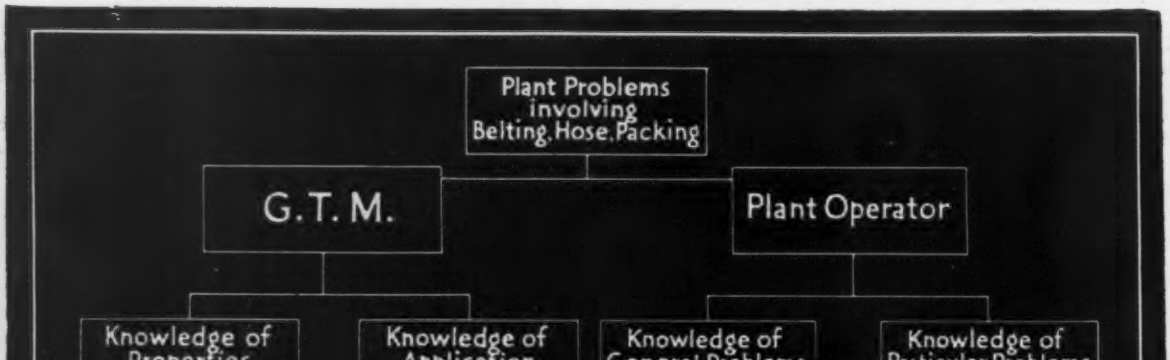
3. Sampling and Testing.

(a) Sampling.—The purchaser will bear all expense of sampling and testing. When quicklime is shipped in bulk, the sample shall be so taken that it will represent an average of all parts of the shipment from top to bottom, and shall not contain a disproportionate share of the top and bottom layers, which are most subject to changes. The sample shall consist of one shovelful for each three tons of material, but not less than ten shovelfuls (for each three tons) taken from different parts of the shipment. The total sample taken shall weigh at least 100 pounds, and shall be crushed to pass a one-inch ring, mixed thoroughly, and "quartered" to provide a 15-pound sample for the laboratory. In case a shipment consists of more than one car, a separate sample shall be taken from each car.

When quicklime is shipped in barrels, at least 3 per cent of the number of barrels shall be sampled. They shall be taken from various parts of the shipment, dumped, mixed, and sampled as specified in the above paragraph.

When sampling quicklime, it is essential that the operation be conducted as expeditiously as possible, in order to avoid undue exposure of the material to the air. The sample to be sent to the

[1] It is recommended that a bonus or a penalty of one and one-half per cent of the contract price be added to or deducted from the payment for each one per cent of available lime above or below the standard 85 per cent. It may be desirable in some cases to make other constituents than lime subject to bonus or penalty provisions.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laboratory shall immediately be placed in an air-tight container, in which the unused portion shall be stored until the shipment has been finally accepted or rejected by the purchaser.

The sample may be taken either at the point of shipment or at the point of destination, as agreed upon by the contracting parties.

(b) Testing.—Details regarding the complete analysis of lime are given in other papers of this series and in Bulletin 700 of the United States Geological Survey.

Available Lime

1. Weigh 1.4 g. of the carefully prepared and finely ground (passing a No. 100 sieve) lime into a 250 cc. beaker, add 200 cc of hot water, cover, heat carefully and then boil for 3 minutes.

2. Cool, wash down cover, add two drops of phenolphthalein and titrate with normal hydrochloric acid, adding the acid as rapidly as possible by dropping, stirring vigorously to avoid local excess of acid. When white spots appear, retard the rate of addition of acid somewhat, but continue until the pink color fades out throughout the solution for a second or two. Note the reading and ignore the return of color.

3. Repeat the procedure of paragraph 1 above, using (instead of the beaker) a one-half liter graduated flask carrying a one-hole stopper fitted with a short glass tube drawn out to a point. Cool, add slowly 4.5 cc. less acid than before, stirring vigorously. Call the number of cc. used "A." Grind up any small lumps with a glass rod slightly flattened at one end, dilute to the mark with distilled water, stopper, mix thoroughly for four or five minutes, and let settle for half an hour.

4. Pipette off a 200 cc. portion, add phenolphthalein and titrate slowly with half-normal hydrochloric acid until colorless on standing one minute. Call this additional number of cc. "B." Then per cent of available lime $2A + 2.5B$.

Magnesia

The magnesia determination is made after removing silica, iron, oxide, alumina, and lime. Ignite one gram, or if the magnesium content is high, 0.5 gram, of the sample strongly in a platinum crucible for 15 minutes. When cool, moisten the residue and dissolve it in 1:1 hydrochloric acid, add 50 cc. of water, and filter off the silica. To the filtrate add 5 cc. of hydrochloric acid, then make it slightly alkaline with ammonia, heat to boiling, and filter off the oxides of iron and aluminum. Acidify the filtrate slightly, heat to boiling, add ammonium oxalate slowly to excess, then ammonia slowly. After the first precipitate has settled, filter and wash with an ammoniacal ammonium oxalate solution. Ignite the precipitate. When cool, moisten it, dissolve in hydrochloric acid, and reprecipitate. Filter off the calcium oxalate, washing with ammoniacal ammonium oxalate solution. To the filtrate add an excess of microcesmic salt and more ammonia. After the precipitate has fully formed, preferably by standing over night, filter and wash with weak ammonia. Dissolve the precipitate in a slight excess of hydrochloric acid, add one or two drops of phosphate solution and reprecipitate by adding ammonia slowly while stirring. Filter, wash with weak ammonia, and ignite to constant weight. Weight of magnesium pyrophosphate $\times$ 0.3621 = weight of magnesium oxide.

For rapid work the iron, aluminum, and first calcium oxalate precipitate may be filtered off with the silica; also the first precipitate of magnesium phosphate may be ignited, or it may be washed slightly with dilute ammonia, then with alcohol until free from ammonia, dried on the paper at 80° C. in a small beaker, dissolved in an excess of tenth-normal (sodium hydroxide, using methyl) sulphuric acid, and titrated back with tenth-normal sodium hydroxide, using methyl orange (cc. acid — cc. alkali) $\times$ 0.00201 = grams magnesium oxide.

Crown Filler

Additional work has also been completed on specifications for Crown Filler. It seems advisable to add to them these requirements:

A limit should be placed on the amount of iron permissible and from analysis of satisfactory and unsatisfactory samples of Crown Filler it is recommended that—

The amount of iron in Crown Filler shall not exceed .002 per cent calculated as Fe203.

A definite specification for dirt or residue should be included and the following is recommended:

The residue obtained upon washing a large sample (1 to 3 kilos) through a standard #80 mesh sieve with warm water shall not exceed 50 milligrams per kilogram.

In the method for acid content, under methods of analysis as given for Crown Filler, it is recommended that a large sample be taken—at least 10 grams—as the acid content is so low that accurate results cannot be obtained on such a small sample.

The test for dirt in Crown Filler is unnecessary as any appreciable amount of dirt would be reflected in the color. The following method is recommended as a substitute for this dirt test:

"Place 200 grams of Crown Filler on a No. 80 mesh sieve and wash by means of a slow stream of running water until all the calcium sulphate has been washed through the sieve. As the amount of residue in Crown Filler is very small it is well to add another 200 grams to the same sieve and proceed as above. The sieve with the residue is dried at 212° F. and the residue finally weighed by brushing on to a balance glass—or where the residue is very small it may be washed into a small beaker, the water evaporated and the residue brushed on to a balance glass as above."

The method used for testing the iron is as follows:

"Take a one gram sample in a 100 cc. casserole and add 5 cc. of conc. HCl (iron free) and warm. Then add sufficient water in small quantities to bring the Crown Filler in solution. Usually about 25 to 30 cc. of H_2O will be sufficient. As soon as the Crown Filler is in solution transfer to a 100 cc. Nessler tube. Add two drops $KMNO_4$ n-10 or until a permanent pink remains. Then add 10 cc. 2 per cent solution potassium sulphocyanide and make up to 100 cc. Compare the color with standard prepared at the same time and using a similar amount of reagents. Add to standard tube the standard iron solution—1 cc. equal to .00001 grams Fe_2O_3 until the color of both tubes is the same."

Method of Analysis for Crown Filler

Crown Filler is chemically calcium sulphate with two molecules of water.

TOTAL MOISTURE

Ignite one gram sample in a platinum crucible over a Maker burner until constant. The loss of weight is the total moisture.

MECHANICAL MOISTURE

Multiply the difference in weight before and after ignition, i. e. the amount of $CaSO_4$ present, by 172 and divide by 136. This gives $CaSO_4$ $2H_2O$. Subtract this from 1,000 grams and the difference will be the mechanical moisture.

COMBINED MOISTURE

The combined moisture is obtained by subtracting the mechanical moisture from the total moisture.

COLOR

Spread out a small amount of Crown Filler (dried at 212° F.) on a black paper; spread along with this a similar amount of C. P. calcium sulphate. Each should be pressed down with a steel spatula to give a smooth surface and the color is then compared. If both are of the same color it will be impossible to see any line of demarcation between them.

FREE ACID

Take 10 or 15 gram sample in a 250 cc. casserole and add 100 cc. distilled water. Add a few drop of methyl orange indicator and titrate with n-50 NaOH. The acidity is then calculated in terms of hydrochloric acid (HCl).

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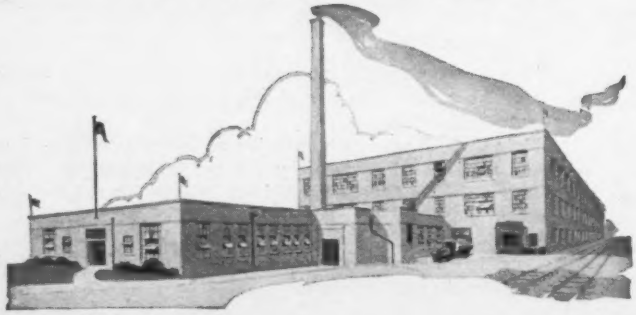

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RESIDUE

Place 200 grams of Crown Filler on a #80 mesh sieve and wash by means of a slow stream of running water until all the calcium sulphate has been washed through the sieve. As the amount of residue in Crown Filler is very small it is well to add another 200 grams to the same sieve and proceed as above. The sieve with the residue is dried at 212° F. and the residue finally weighed by brushing on to a balance glass—or where the residue is very small it may be washed into a small beaker, the water evaporated and the residue brushed on to balance glass as above.

IRON

Take a one gram sample in a 100 cc. casserole and add 5 cc. of conc. HCl (iron free) and warm. Then add sufficient water in small quantities to bring the Crown Filler in solution. Usually about 25 to 30 cc. of H_2O will be sufficient. As soon as the Crown Filler is in solution transfer to a 100 cc. Nessler tube. Add two drops $KMNO_4$ n-10 or until a permanent pink remains. Then add 10 cc. 2 per cent solution potassium sulphocynaide and make up to 100 cc. Compare the color with standard prepared at same time and try similar amount of reagents. Add to standard tube the standard iron solution—1 cc. equal to .00001 grams Fe_2O_3 until the color of both tubes is the same.

American Writing Paper Co., Holyoke, Mass., Purchasing Department Specifications for Crown Filler

A. The material desired under these specifications is known as Crown Filler, and is calcium sulphate with two molecules of water. It shall be packed in clean wooden barrels, and protected from direct contact with the barrel by a clean wrapper.

B. Color: Pure white equal when dried out to C. P. calcium sulphate, $CaSO_4$, 2 H_2O, tested purity.

C. The Crown Filler as shipped must not contain more than (34%) thirty-four per cent of total water.

D. The free acid content of the Crown Filler must not be greater than 0.05 per cent of the Filler as shipped, figured as hydrochloric acid.

E. Residue: The residue obtained upon washing a large sample (1 to 3 kilos) through a standard 80 mesh sieve, with warm water, shall not exceed 50 milligrams per kilogram. Iron: The amount of iron in the Crown Filler shall not exceed .002 per cent calculated as Fe_2O_3.

F. Before contract is made, a five-pound sample representing 5 per cent of a carload should be submitted to the Department of Technical Control, American Writing Paper Company, for analysis.

G. Right is reserved to reject any or all shipments not meeting these specifications. In the case of excess moisture content, an adjustment proportional to the excess may be exacted at the option of the purchaser.

H. Terms, quantities, deliveries, etc., must be in accordance with memorandum of agreement hereto attached.

Color Effect of Rosin Size Emulsion on Finished Product

Report to the Annual Meeting of the Technical Association by F. Becker, Chairman Committee on Standard Methods of Testing Materials Used in the Pulp and Paper Industry.

I. Purpose of Investigation

COLOR OF EMULSION DIRECT BEARING ON PAPER.

The manufacturers of fine papers have been bothered at times by a great variation in the color of the finished product, and the writer has had opportunity to check the various factors which have a direct bearing on the color and finds that the color of the size milk as it is added to the beater has a direct bearing on the final product.

Writer has observed in several different mills that where the color of the size milk is dark the paper will not respond to the effect of the aniline dyes and where, for instance, if a brilliant white paper is wanted a grayish white paper will be produced. It was formerly the accepted theory that the color of the size milk had nothing whatever to do with the color of the finished product, and it was thought that size made from "G" rosin would give a "G" rosin color to the paper, regardless of whether the size milk was brown in color or creamy white. This the writer has found to be a fallacy. In order to overcome this difficulty the Committee on Standards has felt the need of an investigation to determine the various factors which govern the color of rosin size emulsions.

II. Needs of a Standard

1. GRADING OF ROSIN.

At the present time, color is the only factor taken into consideration in the grading of rosin. Standard cubes of rosin prepared by the supervising inspectors are used by the inspectors to determine the grade of rosin. Recently, however, standard glass cubes of the proper color have been prepared under the supervision of the Bureau of Standards, at Washington.

Grading rosin in this way is not entirely satisfactory where the rosin is to be used for the making of rosin size, as color is only one of the factors which have a bearing on the finished product.

In order to determine if possible whether or not factors other than color had any relation with one another, tests were made on samples of rosin from the grades principally used in the preparation of rosin size and the results were plotted. You will notice on the chart below the wide range of variations occurring. Unsaponifiable matter alone varies from 3 to 17 per cent and the other factors have a variation almost as great. For this reason proper attention must be given to these factors if a uniform size is to be obtained.

Experiments have been made with the higher grades of rosin and while in a few instances success has been obtained, in the very big majority the results have shown that while this rosin might have improved the color slightly, yet it required a very much larger amount of the paler rosin to produce the same results as we obtain from the grades F, G and H. It is the writer's opinion that the discrepancy may be accounted for by the fact that the paler grades probably contain small amounts of pine oil and substances of a similar nature, and that the pine oil has a tendency to coat the fibers and prevents the rosin from coming into intimate contact with these fibers.

2. ACTION OF SODA ASH.

When rosin is treated with hot soda ash solution saponification results. Recent experiments have shown that commercial rosin contains not only abietic acid but also from two to three per cent of colo-phenic acid. While the salts of abietic acid were fairly light in color the salts of colo-phenic acid are of a very dark brown color and no doubt are detrimental to the color of rosin size. Further investigations disclosed that while the salts of abietic acids are not readily soluble in water the salts of colo-phenic acid are, and if these salts could be removed no doubt the color of the size would be greatly improved. This, however, would be a very expensive and laborious task, and writer would not recommend its general use at the present time.

3. FREE ROSIN IN SIZE.

Rosin sizes used at the present time vary in their free rosin con-

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tent from almost no free rosin to 45 per cent free rosin. Experience has shown that other factors being the same, the color of the size emulsion will vary directly in accordance with the amount of free rosin. This applies, however, only when no attempt is made to produce transparent, amber colored emulsion.

4. EMULSIONS.

Besides the above factors before mentioned the methods of emulsification have a direct bearing on the color of rosin size emulsions.

(a) *Temperature of Size.*

The color of the emulsion is directly affected by the temperature of the size wax which is to be emulsified. As this temperature is increased the final color will be darker. To obtain a creamy white color the temperature of the size wax should be kept at least under 140° F.

(b) *Temperature of Water.*

This factor has a very important bearing on the color of the finished (product) emulsion. Where a white color is desired care must be taken that the exact amount of water is put into the emulsion tank at the start as the addition of cold water into hot size emulsion has a tendency to set the color, whereas if no cold water is added the color of the size milk upon cooling actually becomes lighter and lighter until when it reaches room temperature it becomes creamy white. The explanation for this phenomenon has been offered that the addition of cold water sets the rosin particles at the size they are after the emulsion is made. But if the emulsion is allowed to cool slowly the rosin particles have a tendency to adhere to one another, forming larger particles and thereby whitening the size emulsion. The accepted explanation of what causes the color in size milk is that the light reflecting off these particles gives the size emulsion a characteristic color. If, however, the particles are so small that there is no reflection of light the color of the size is more transparent.

When using a size containing between 20 and 35 per cent free rosin, the writer has found that a temperature of not over 140° should be exceeded if a light colored emulsion is desired. Experiments have proved that 120° will produce a size milk which is creamy in color. Size men in the mills should be required to keep the temperature of the emulsion water at an absolute constant, for if they are allowed to use their own judgment un-uniform results will result.

III. Methods of Controlling Color of Size Emulsions

1. CHARTS.

It is possible to control the color of size emulsions by means of color charts, but the writer does not recommend these charts for the following reasons: First, it is very difficult to obtain a chart having the proper range of colors. Secondly, it requires the service of an expert to prepare these charts. Third, unless these charts are made from oil colors, the color is not permanent.

2. STANDARD EMULSIONS.

Where good color has been obtained the mill should have sample of size milk so that this emulsion can be used for the purpose of comparison at a future date. This method, however, will only be crude at the best.

3. LIQUID STANDARDS.

Writer recommends that samples be prepared by using any standard white ink diluted with standard ferric chloride solution. By manipulation a wide range of colors which are encountered in rosin size emulsions can be obtained and these can be used as standards.

4. ALUM PRECIPITATE.

The color of the alum precipitate will also show whether or not a size is suitable for high-grade papers, but the range of colors covered by the alum precipitate will not be so large as that of the size emulsions; therefore, this method will not produce as good results. It will, however, serve as a check on the other to some degree.

Sulphur in Sulphite Waste Liquor

Read at Annual Meeting of Technical Association by George Barsky, Dept. Chemical Engineering, Columbia University.

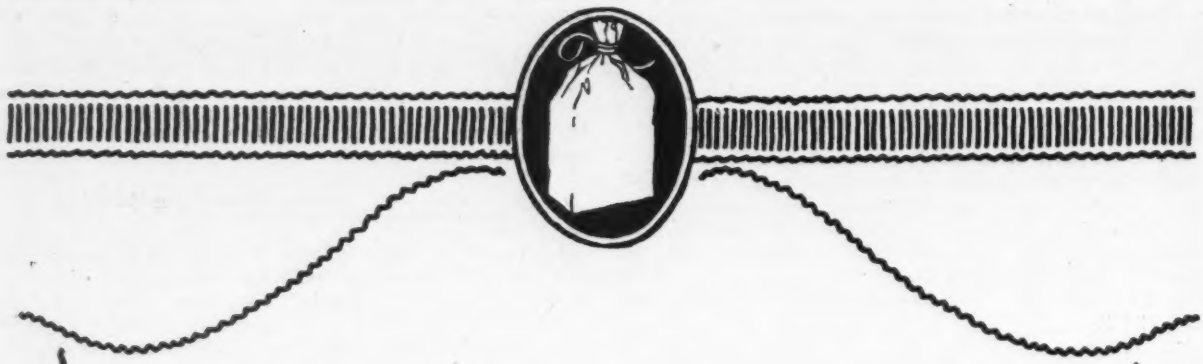
The sulphite process for the production of pulp, involving as it does the cooking of wood with calcium bisulphite solution containing an excess of sulphur dioxide, may be regarded as a chemical process having for its object the dissolving out of all of the constituents of the wood except the cellulose. A part of the wood is soluble in water[1], [2], without any noticeable chemical reaction. According to Klason,[2] this amounts to about twelve per cent of the weight of spruce wood. The reactions, whatever they are, result in the addition of sulphur to the organic matter that goes into solution. We have investigated the form of combination of the sulphur in the liquor and from our results we have concluded that there are at least three distinct forms in which the sulphur is present in organic combination, in addition to that present as free SO_2, bisulphite, and normal sulphite.

It is commonly supposed that the waste liquor contains at least two sulphonic acids of lignin. Klason[3], [4] has separated two "ligninsulphonic acid" salts from waste liquor, one by salting out with calcium chloride and the other by treatment of the residual solution from the salting out operation with naphthylamine hydrochloride. He considers that the original lignin may be regarded as being composed of 63 per cent of one and of 37 per cent of the other[4], [5].

It is possible that there may be several lignins, such as the "proto-, hemi-, and ortholignins," suggested by König and Rump.[6] There may be several compounds in the liquor all derived from the same basic compound or compounds by some slight chemical change, such as a mild oxidation, or the splitting out of sulphur dioxide from the molecule, etc.

Indeed, despite the common statement that the principal constituents of the liquor are ligninsulphonic acids or their salts, absolute proof that some of the sulphur is present in the form of a sulphonic acid grouping is lacking. Hönig and Fuchs[7] found that by alkali fusion of "barium ligninsulphonate" at 300° C. they could split off 90 per cent of the sulphur, and could recover 15 to 19 per cent of the organic matter as catechol and protocatechuic acid. In the light of these results they maintain that the nucleus of the lignin is similar to that of protocatechuic acid. They also consider that these results prove that the sulphur is combined in the form of a sulphonic acid of an aromatic nucleus. However, this is not conclusive, as they have no proof that the hydroxyl groups are formed by alkali fusion in the same way that phenol is formed from benzenesulphonic acid by alkali fusion. The catechol and protocatechuic acid may be formed by a rearrangement during fusion. Cellulose on alkali fusion will give these substances. For example, Hoppe-Seyler[8] found that 50 grams of lignin-free filter

[1]Shorger, A. W. J. Ind. Eng. Chem. 9, 560 (1917).
[2]Klason, P. Beitrage zur Kenntiss der Chemischen Zusammensetzung der Fichtenholzes. Berlin, 1911.
[3]Klason, P. Arkiv. Kemi. Min. Geol., 6, No. 15, 1-21 (1917). C. A., 14, 2167.
[4]Klason, P. Ber. 53B, 1862 (1920); C. A. 15, 859.
[5]Klason, P. Ber. 53B, 1864 (1920); C. A. 15, 860.
[6]König, J. and Rump, E. Chemie und Struktur der Pflanzen-Zellmembran. Berlin, 1914.
[7]Hönig, M. and Fuchs, W. Monatsh. 40, 341 (1919)
[8]Hoppe-Seyler. Zeit. Physiol. Chem. 13, 77-82 (1889).



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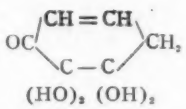
paper, 25 grams of KOH and 250 cc. of water, heated to 250° C., gave .64 grams of almost pure protocatechuic acid and a trace of catechol.

Practically all the evidence points to the view that lignocellulose, or rather the lignocelluloses, since they vary somewhat among themselves, are chemical combinations of celluloses with other constituents commonly known as lignins. There are, in all probability, several lignins closely related in general structure. Concerning the celluloses, there is a great deal of information available, yet the subject is still one of much theorizing and experimentation.[9] Concerning the lignins, there is as yet very little, if any, really definite information about their structures.

Several theories have been proposed, notably that lignin is a product of the condensation of coniferyl and hydroxyconiferyl alcohols. This theory is generally attributed to Klason.[3] Another theory is that of Cross and Bevan.[10] They are of the opinion that the nucleus of the lignin molecule is a keto — R hexene group,



to which are attached other groups, such as methoxyl, acetyl, etc. The form of combination between lignin and cellulose is not definitely known. Most authors[11], [12] assume that it is either an ester or an ether, since cellulose is known to contain alcoholic hydroxyl groups, and lignin is assumed to be either an acid or an alcohol. In addition to these two possible forms, ester and ether, we may include another form, that of an acetal, since the ligneous material present in sulphite waste liquor seems to have several carbonyl groups in the molecule. These proposed forms of combination between cellulose and lignin are in accordance with the characteristic property,[13] that of responding to hydrolytic treatment.

I. Determination of "Free SO_2"

The sum of the sulphurous acid, the bisulphite, and the sulphite present in sulphite waste liquor, all expressed as SO_2, is what is known as the "free SO_2." It is customarily determined[14] by titration with standard iodine solution, with the ordinary starch solution as indicator. As the end point is a vanishing one, owing to the progressive formation of more SO_2 by the decomposition of the "loosely combined SO_2" (see below), practice is required before results can be duplicated.

It was found that the primary variable factors that must be considered in studying this titration are the dilution and the temperature at which the titration is performed.

A. The Effect of Dilution

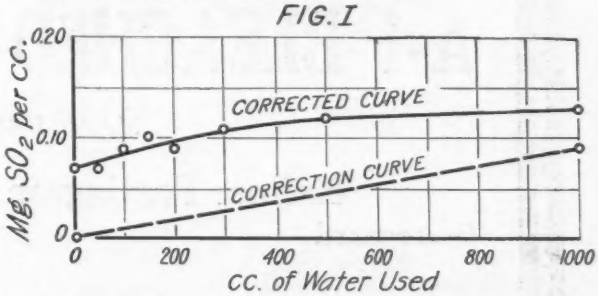
To determine the effect of dilution, 10 cc. portions were taken of liquor A.[15] To each a measured amount of distilled water was added. 2 cc. of starch solution (1:200) were then added and the titration performed in the usual manner. The effect of dilution on the end point varies directly as the dilution, as it represents the amount of standard solution required for the titration of amounts of pure water. The corrections for this effect were determined by running blanks with 10 cc. and 100 cc. of distilled water and drawing a line, give the correction for any dilution. In this way the following data were obtained and the curve plotted. (Table I, Figure 1.)

TABLE I.

cc. of H_2O added	Cc. I_2 sol.	Cor.	cc. net	mg. SO_2 per cc. liq.
0	0.6	0.0	0.6	0.07
50	0.7	0.1	0.6	0.07
100	0.9	0.1	0.8	0.09
150	1.0	0.1	0.9	0.10
200	1.0	0.2	0.8	0.09
300	1.3	0.3	1.0	0.11
500	1.6	0.5	1.1	0.12
1000	2.1	0.9	1.2	0.13
Blank	..	..	..	...
10	0.0	..	..	...
1000	0.9	..	..	...

Titrations performed at room temperature, 20° C.
Iodine solution standardized against sodium arsenite.
1 cc. of I_2 solution equivalent to 1.09 mg. of SO_2.

FIG. I



These experiments show that the amount of free SO_2 increases with the dilution at a decreasing rate. This would seem to indicate that there is present some very unstable form on combination of SO_2. However, the small increase in free SO_2 means that it is either present in small amount or that an equilibrium exists between the free and combined SO_2 and that the equilibrium conditions are satisfied by small concentrations of SO_2. When we alter the concentration of the combined SO_2 by diluting, we also alter the concentration of free SO_2 required for the equilibrium. If such an equilibrium exists, the concentrations of SO_2 required are very small.

B. The Effect of Temperature

This effect was determined by taking 10 cc. portions, adding 50 cc. of distilled water and 2 cc. of starch solution, bringing to the required temperature as registered by a thermometer immersed in the liquid by externally heating or cooling the flask and titrating immediately. Temperature has a slight effect upon the end point when distilled water is titrated with iodine solution. To eliminate this effect upon our data, a titration was performed with 50 cc. of distilled water at the highest temperature involved. 0.7 cc. were required. Thus this correction is slight and no appreciable error is introduced if we consider that the correction for the other temperatures is proportional to the temperature. From the data, Table II, a curve, Figure 2, was plotted.

TABLE II.

Temp.	Cc. I_2 sol.	Cor.	Net cc. I_2 sol.	mg SO_2 per cc.
1°C	0.7	0.0	0.7	0.08
11°C	0.7	0.1	0.6	0.07
21	0.8	0.2	0.6	0.07
41	1.1	0.4	0.7	0.08
30	0.9	0.3	0.6	0.07
50	1.5	0.5	1.0	0.11
70	3.9	0.7	3.2	0.35
Blank 70	0.7	..	..	...

1 cc. I_2 sol. = 1.09 mg SO_2.

These results indicate that profound decomposition of SO_2 bearing substance occurs when sulphite waste liquor is heated to even a moderate temperature. Therefore, for strictly concordant results the free SO_2 must be titrated at a low temperature, and preferably at the same temperature every time. This is most easily done by adding ice to the solution. The curve, Figure 1, showing the effect of dilution makes it clear that the error of dilution due to the addition of a small amount of ice is negligible.

II. Determination of "Loosely Combined SO_2"

The sulphur dioxide mentioned above as easily split out of the

[9]Hibbert, H. J. Ind. Eng. Chem. 13, 256, 334 (1921).
[10]Cross and Bevan. Cellulose, 1918, p. 77.
[11]Schwalbe, C. G. Chemie der Cellulose. Berlin, 1911.
[12]Klein, A. Paper, 24, 351, 409 (1919).
[13]Cross and Bevan. Cellulose, 1918, p. 208.
[14]Sutermeister, E. Chemistry of Pulp and Paper Making, 1920, p. 191.
[15]By courtesy of Abitibi Power and Paper Company.

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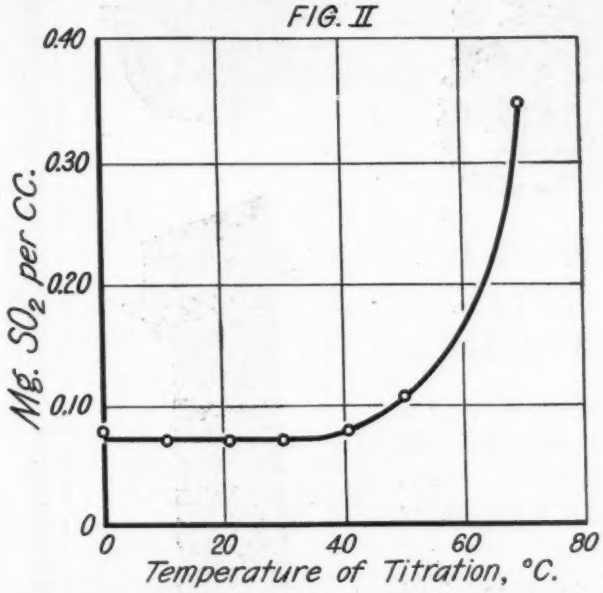
organic molecule is known as the "loosely combined." It is known by this name because it is readily removable from the organic molecule by treating with alkali solution.

A. Reaction of Alkali at the Temperature Attained by Use of a Water Bath

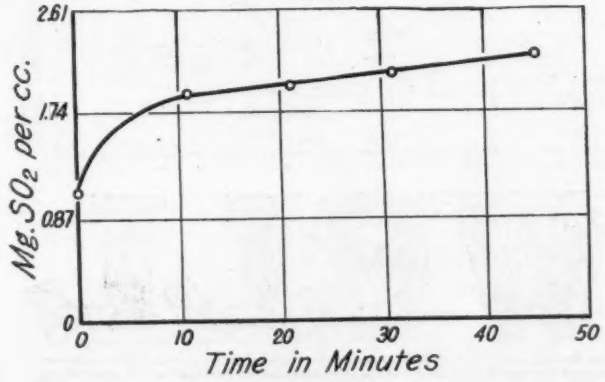
One hundred cc. of sulphite waste liquor and one hundred cc. of sodium hydroxide solution (100 g. of NaOH per liter) were mixed

FIG. II



and the flask containing the mixture placed upon a water bath. A thermometer was immersed in the mixture. At intervals twenty-five cc. portions were pipetted out and ice added in sufficient quantity to bring the solution to zero degree centigrade. Sulphuric acid solution (made by diluting acid of specific gravity 1.84 with an equal volume of water) was added, with vigorous agitation until the alkali in the liquor was just neutralized, the amount necessary to neutralize 12.5 cc. of alakli solution having been previously de-

FIG. III



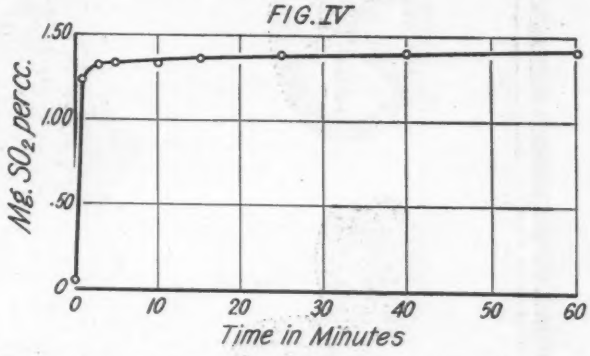
termined. After neutralization, the titration was proceeded with immediately in the usual manner.

In this way, the data given below, Table III, were obtained, and the curve representing them plotted, Figure 3. Examination of the curve shows that the mixture of alakli and waste liquor must be allowed to remain on the water bath for at least ten minutes to obtain concordant results, since the amount of SO_2 split out does not become constant before that time has elapsed. Moreover, it is best to leave the mixture on the water bath for the same time interval for each determination.

B. Reaction at Room Temperature

It was next decided to investigate the reaction at room temperature. Equal volumes of waste liquor and NaOH solution were mixed as before and 25 cc. portions removed and titrated in the

FIG. IV



manner described above. Thus we obtain the data of Table IV, shown graphically in Figure 4. Similarly, with liquor B,[16] data for the same kind of a curve were obtained, Table V, Figure 5.

Examination of these curves shows that the reaction is complete or rather comes to final equilibrium in about ten minutes.

If the temperature is raised above room temperature, say, to the temperature attainable by means of a water bath, an additional amount of SO_2 will be split off. If the mixture is cooled to room temperature again, we find that the amount of SO_2 split out is still the same as that split out at the higher temperature. This proves that the increase in amount is not due to a displacement of the equilibrium with the change of temperature. Were the increase in amount of SO_2 split out due to such a temperature dis-

TABLE III

Time elapsed, min.	Temp. °C	I_2 sol. cc.	mg. SO_2 per cc. liquor
0	44	12.3	1.07
11	88	21.9	1.90
21	89	22.2	1.93
31	89	23.7	2.06
45	88	25.2	2.19
Original liquor, 25 cc.		1.2	0.05

25 cc. of sodium hydroxide solution required 6.5 cc. of H_2SO_4 solution for neutralization with phenolphthalein as indicator. Therefore 3.2 cc. were added each time to neutralize the NaOH before titrating.
1 cc. of standard I_2 solution equivalent to 1.09 mg. of SO_2.

TABLE IV. (Liquor A)

Time elapsed, min.	Cc. I_2 sol.	mg. of SO_2 per cc. of liquor
0	...	0.05
1	12.7	1.00
3	15.7	1.24
5	16.1	1.27
10	16.6	1.31
15	16.5	1.30
25	17.3	1.37
40	17.5	1.38
60	17.3	1.37

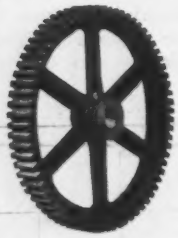
Room temperature 23° C.
1 cc. of standard I_2 solution equivalent to 0.987 mg. of SO_2.

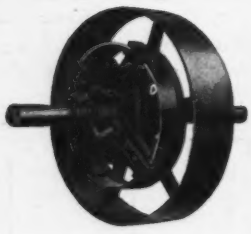
TABLE V. (Liquor B)

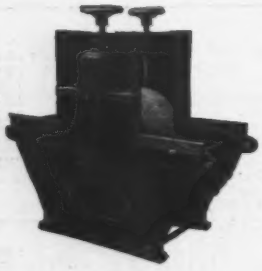
Time elapsed, min.	I_2 sol. cc.	mg. of SO_2 per cc. liquor
0	...	0.02
1	15.6	1.04
3	16.3	1.09
5	16.5	1.10
10	16.1	1.07
15	17.1	1.14
25	17.3	1.15
40	16.9	1.13
60	17.8	1.19
100	18.2	1.21
130	18.3	1.22

Room temperature 23° C.
1 cc. of standard solution of I_2 equivalent to 0.835 mg SO_2.

[16]By courtesy of Price Bros. & Co.







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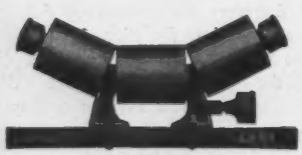


placement of the equilibrium, then reversion to the original temperature should result in a decrease to the amount split out at the original temperature. Therefore, the reaction at the higher temperature must include a different one from that at the lower temperature. Table VI and Figure 6 show the splitting out of additional SO_2 when the temperature is raised.

FIG. V

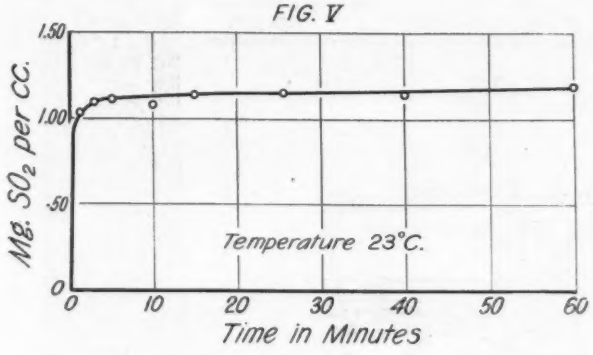


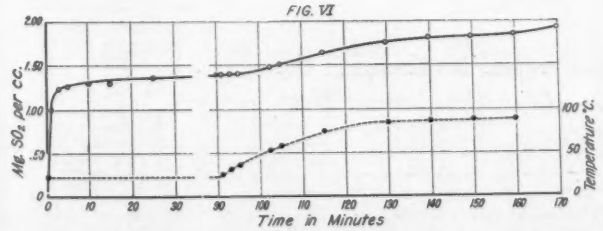
TABLE VI

Time elapsed, min.	Temp., °C	I_2 sol. cc.	mg. SO_2 per cc. liquor
0	23	...	0.05
1	23	12.7	1.00
3	23	15.7	1.24
5	23	16.1	1.27
10	23	16.6	1.31
15	23	16.5	1.30
25	23	17.3	1.37
40	23	17.5	1.38
60	23	17.3	1.37
90	23	17.9	1.41
91	26	17.9	1.41
93	32	17.9	1.41
95	38	17.7	1.40
102.5	53	18.9	1.49
105	58	19.1	1.51
115	74	20.8	1.65
130	85	22.1	1.75
140	87	23.0	1.82
150	89	23.2	1.83
160	89	23.4	1.85
170	89	24.4	1.93

1 cc. of I_2 solution equivalent to 0.986 mg of SO_2.

The examination of the velocities of reaction also shows a difference of reaction under certain conditions. If the same reactions proceed at a higher temperature, then the velocity of reaction is greater at the higher temperature. Assume, for example, that we have two reactions taking place at different temperatures. If the velocity of the reaction at the higher is smaller than the velocity of the reaction taking place at the lower temperature, then the reactions are not identical, since for a given reaction an elevation of temperature results in an increase in velocity of reaction.

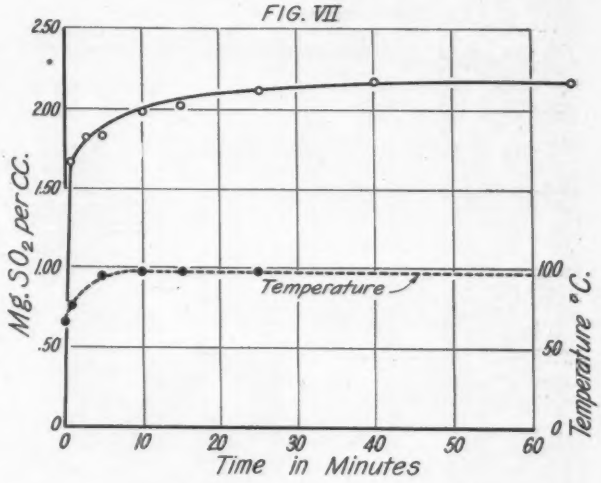
FIG. VI



The ideal way of performing an experiment to determine the velocity of the reaction between sulphite waste liquor and alkali at a temperature higher than room temperature, would be to heat up the alkali solution and the waste liquor separately to the desired temperature and then to mix the two. Samples for analysis could be withdrawn from time to time. However, this procedure could not be followed because when waste liquor is heated up separately, a loss of SO_2 occurs.

For this reason the experiment was carried out by heating up the alkali solution and then adding the waste liquor to it. This method had the disadvantage that the temperature is not uniform during the course of the experiment, but rises from the minimum

FIG. VII

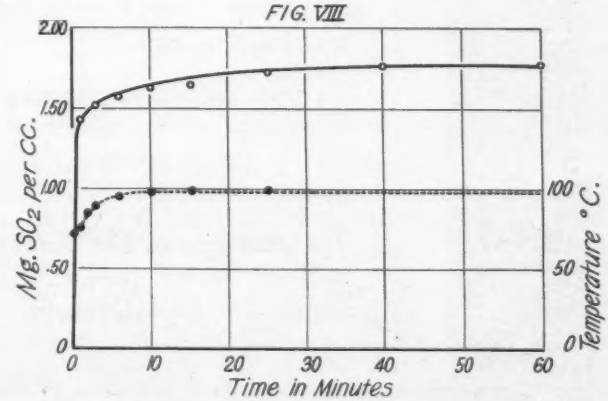


and finally reaches a maximum. However, since at all times the temperature is higher than room temperature, the same data, though not exactly quantitative, would indicate a difference of reaction. Accordingly, the experiment was carried out in this fashion.

The apparatus used consisted of a 500 cc. short-necked round-bottom flask, equipped with a stopper, through which passed a thermometer, reaching almost to the bottom, and a short piece of tubing serving as an air condenser to prevent excessive evaporation. The flask was immersed to about three-quarters of its volume in a boiling water bath. The samples for analysis were withdrawn by temporarily removing the stopper and using a pipette.

The 100 cc. of alkali solution were first placed in the flask and the temperature allowed to reach the desired point. The 100 cc. of sulphite waste liquor were then added and the contents of the flask thoroughly mixed. The temperature was noted then and at

FIG. VIII



the time of the removal of each sample. The initial time was taken at the instant when the addition of the waste liquor was completed.

In these experiments the molecular ratio of NaOH to SO_2 split out is about 80 to one. In other words, the NaOH is present in so large an excess that its concentration does not alter appreciably during the course of the reaction and therefore we may neglect the changes in concentration of NaOH in our discussion.

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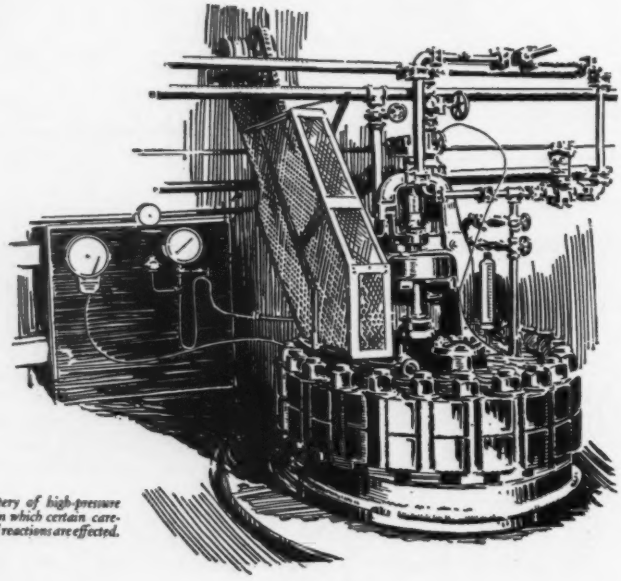

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In the manner described above, data were obtained for the reactions at the higher temperature of the two liquors previously investigated. These data are shown in Tables VII and VIII, and graphically in the corresponding curves.

TABLE VII (liquor A)

Time elapsed min.	Temp. ° C	I_2 sol. cc.	mg. SO_2 per cc. liquor
0	65	....	0.05
1	74	19.7	1.65
3	87	21.6	1.81
5	94	21.7	1.82
10	97	23.5	1.97
15	97	24.6	1.64
15	97	24.1	2.02
25	97	25.2	2.11
40	97	25.9	2.17
65	97	25.8	2.16
90	97	26.3	2.20
Allowed to cool to	23	25.8	2.16

1 cc. of standard I_2 solution equivalent to 1.047 mg. of SO_2.

TABLE VIII (liquor B)

Time elapsed min.	Temp. ° C	I_2 sol. cc.	mg. SO_2 per cc. liquor
0	69	....	0.02
1	73	21.4	1.43
3	88	22.7	1.51
6	94	23.4	1.56
10	97	24.3	1.62
15	97	24.6	1.64
25	99	25.7	1.71
40	98	26.5	1.76
60	98	26.6	1.77
90	98	27.4	1.82
Cooled to	23	27.0	1.82

1 cc. of standard I_2 solution equivalent to 0.835 mg. of SO_2.

Let us examine these curves. At the low temperature, the reaction is completed in approximately ten minutes. At the high temperature, the reaction cannot be considered complete until about forty minutes have elapsed. In other words, the net reaction at the higher temperature is slower than that at the low. This proves that there must be another reaction taking place at the higher temperature. This reaction proceeds so slowly that the net velocity, involving the low temperature reaction speeded up by the elevation of the temperature, is less than the velocity of the low temperature reaction.

In addition to the discussion of the data on the velocities of the reactions at the different temperatures, we have available other data supporting our conclusion, i. e., the data on the actual amounts of SO_2 split out. For example, with liquor A the amount of SO_2 split out at room temperature was 1.38 mg. per cc. The amount split out at the higher temperature was 2.16. One and one-half times 1.38 is 2.07. In other words, it looks as if for every two moles of SO_2 split out at the low temperature, there is an additional mole which can be removed at the higher temperature. The same ratio is true for liquor B. The figures for this liquor are 1.22 at the low temperature and 1.80 at the high. One and one-half times 1.22 is 1.83. Tabulating these figures for convenience in examining them we have:

Liquor	Split out at Low temp. L	Split out at High temp. H	Ratio L:H
A	1.38	2.16	2:3.13
B	1.22	1.80	2:2.95

Considering the error in titrating and the probable presence of many compounds in small amounts, the agreement of the figures is quite good.

We have additional evidence of the presence of these two kinds of SO_2 in combination. When sulphite waste liquor is boiled, there occurs an escape of SO_2 from the liquor. For example, in a modification of one of the industrial processes for the production of alcohol by the fermentation of sulphite liquor, one step consists in boiling the liquor to lower its SO_2 content. This is assisted by the passage of air through the liquor to carry off the SO_2. Since the waste liquor is acid, this may be considered to be the effect of acid treatment. After several hours of boiling, the SO_2 content reaches a nearly constant figure.

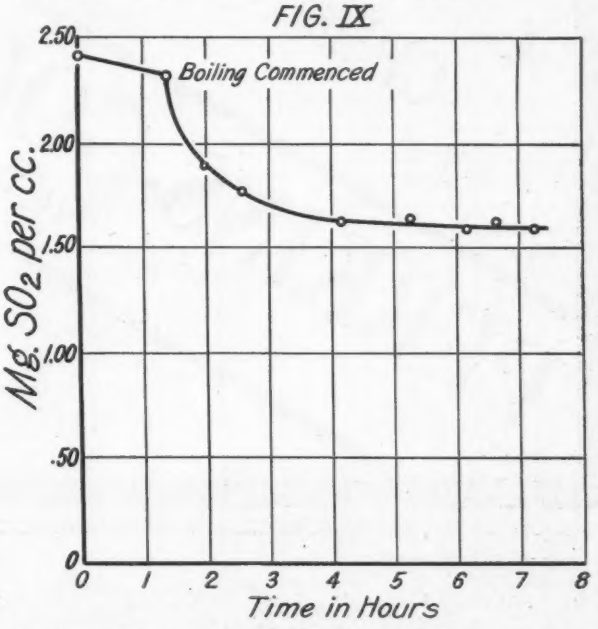
We have performed the experiment in the laboratory and have examined the SO_2 content during the course of boiling. Some of the data are here reproduced, together with their graph, Table IX, Figure 9.

TABLE IX

Time elapsed hrs.:min.	I_2 sol. cc.	mg. SO_2 per cc. liquor	
0:00	17.7	2.42	
1:25	16.9	2.32	boiling commenced
2:00	13.8	1.89	
2:36	12.9	1.77	
3:14	12.2	1.67	
4:10	11.8	1.62	
5:16	11.9	1.63	
6:10	11.5	1.58	
6:38	11.8	1.62	
7:15	11.5	1.58	

1 cc. of standard I_2 solution equivalent to 1.37 mg. of SO_2.

FIG. IX



In the analyses, the SO_2 was split out by alkali at a high temperature, that attainable by a water bath. These data lead to the same conclusion as the data on the velocity of reaction, namely, that there are two kinds of SO_2 and that one kind is present in an amount twice that of the other. For example, one liquor showed 2.42 mg. of SO_2 per cc. before heating was commenced, and after about four hours, when the SO_2 content had reached a minimum, or rather a nearly constant figure, 1.62 mg. per cc. The amount removed by boiling was 0.80 mg. per cc., while the amount unaffected was 1.62. One is approximately twice the other.

The total amount of sulphur is the liquor, expressed as milligrams of SO_2 per cc. is about 7 in the case of liquor A. Therefore, in addition to the two kinds of SO_2 already discussed, there must be at least one more kind, and there probably are several. These, however, are not removed by alkali treatment nor by boiling.

Summarizing:

1. The titrations for free SO_2 and loosely combined SO_2 have been investigated, and the conditions laid down for the most accurate titrations.

2. The splitting out of SO_2 by means of alkali has been investigated, and it has been found that there are two kinds of SO_2 split out. One is split out at room temperature and the other only when the temperature is elevated.

3. The removal of SO_2 from sulphite waste liquor by boiling has been investigated and it has been found that after about four hours the SO_2 content reaches a nearly constant figure. Of the loosely combined, one part is removed by boiling while two parts remain unaffected.

In conclusion I wish to express my appreciation to Professor Ralph H. McKee for his kindly suggestions and criticisms.

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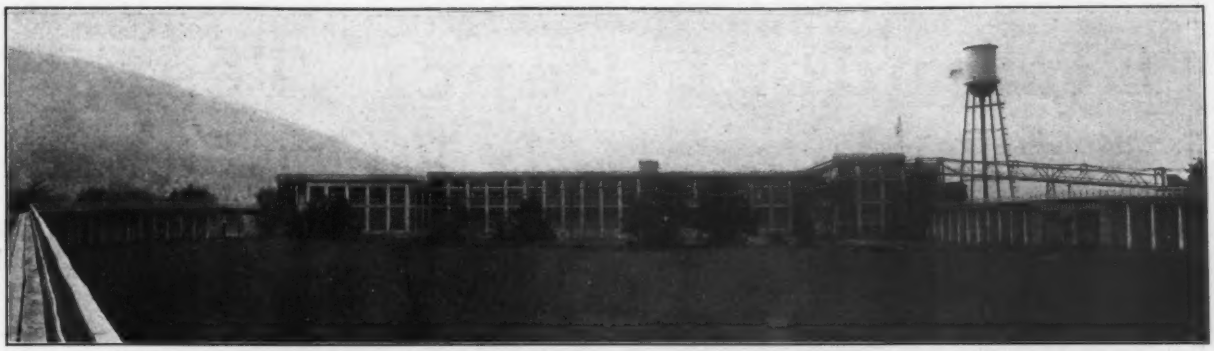

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The New York office of the mill is at 200 Fifth avenue in charge of Gibson Paine, president. The other officers are as follows: Eustis Paine vice-president and treasurer; Douglas Crocker, vice-president; and C. A. Clough, secretary.

Among the ultra modern equipment are four 156-inch Bagley & Sewall Fourdriniers designed to produce 300,000 pounds in 24 hours. The beater and Jordon equipment was supplied by the Pussey-Jones Co. The mill employs between 250 and 300 men.

Although started in the very midst of the period of depression the Castanea mill has established a very enviable record both in the comparatively few working days lost and in the maintenance of its standards of efficient management and quality of product.

The Rhinelander Paper Company, Rhinelander, Wis., has opened an office at 710 Otis Building, Chicago. The new office is in charge of Robert N. McCreary.

VIEW IN MACHINE ROOM OF CASTANEA PAPER CO., LOCK HAVEN,

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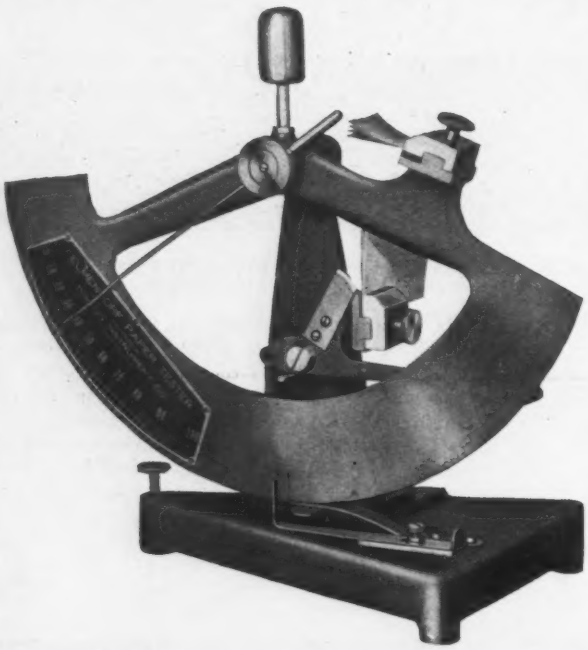

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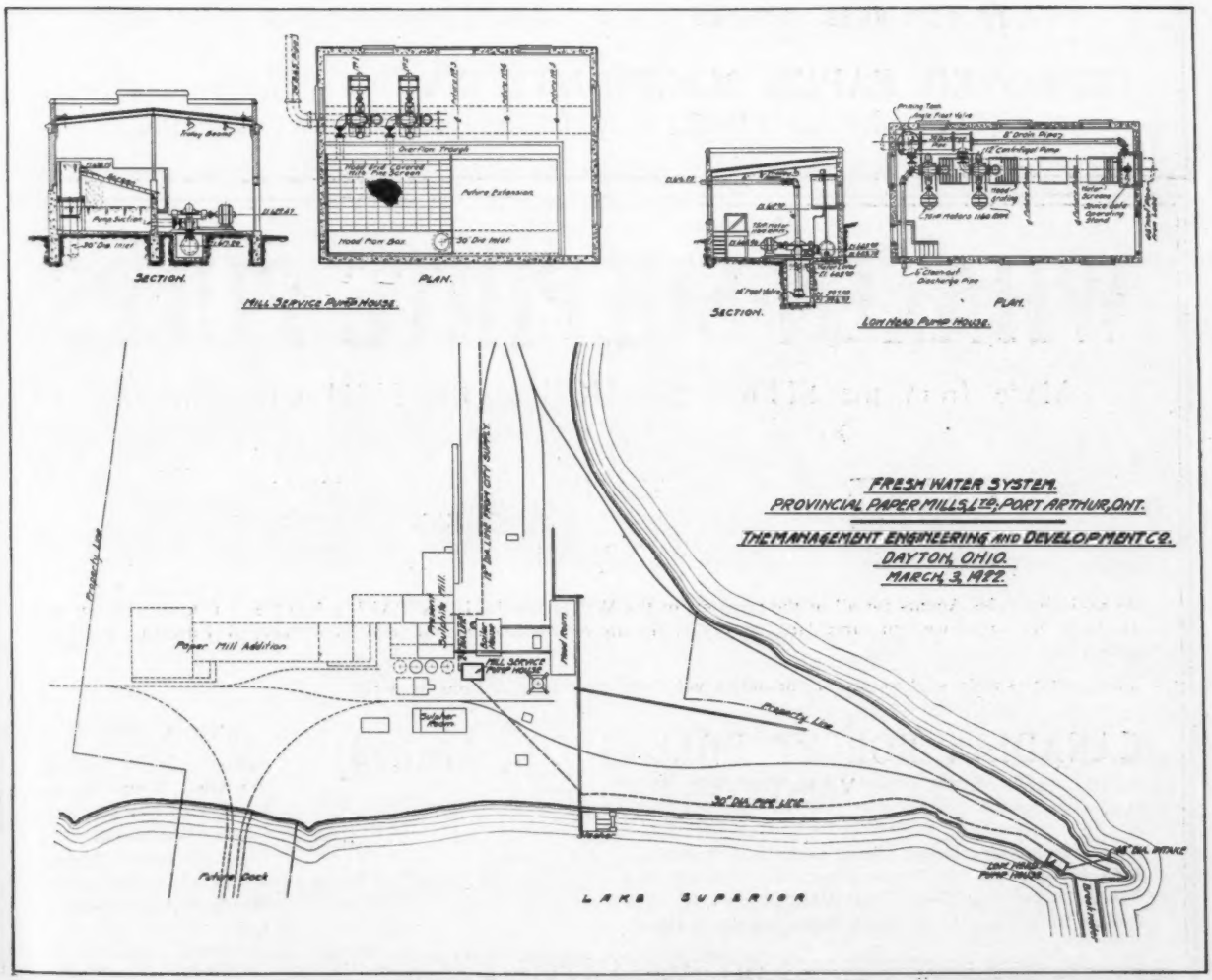
Written Especially for the Annual Number

The Provincial Paper Mills, Limited, have at their mill at Port Arthur recently put in service a modern fresh water supply system that includes several unusual features. This system has been designed and installed to supply their present sulphite mill, proposed new paper mill and other additions that are included in a general improvement scheme.

Prior to the installation of the new equipment, the water supply for the present plant was secured through the City of Port Arthur, the only source of supply at the mill being a steam-driven unit installed originally for fire protection, and later used as an additional supply for manufacturing purposes during periods of heavy draft. This arrangement became less satisfactory as the total demand upon the city station became greater, and finally conditions became such that the city could not, during periods of greatest demand, maintain a satisfactory pressure at the mill, and it therefore became necessary, in order to hold the high quality that has always been noted for Port Arthur sulphite, to install a new fresh water system to supply manufacturing requirements.



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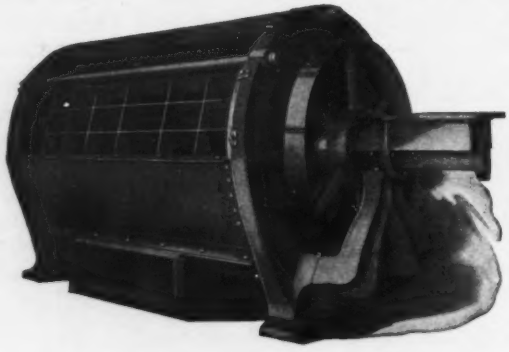

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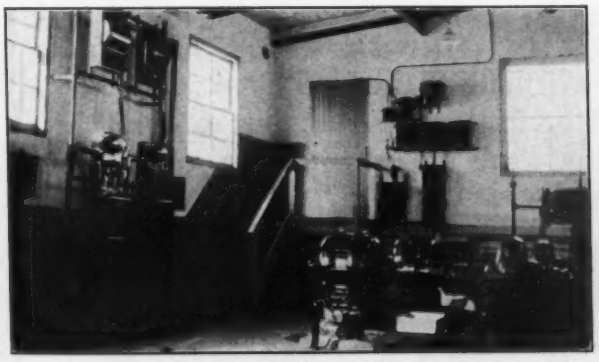
The Provincial Paper Mills, Limited, therefore arranged with The Management Engineering and Development Company to prepare plans and specifications covering an independent installation to serve the existing mill, and also to provide for future demand of the proposed extensions to the present plant. Engineers of the Management company, after a careful study of the conditions, selected the indirect supply system as being best adapted to the service demanded, and prepared specifications, drawings and all other requisites, and also made selection of equipment. Construction work was carried out by local contractors and the mill forces.

As will be noted by observing the general layout the present mill buildings are located some 1,500 feet from point where conditions of drift made location of intake most desirable. The level of Lake Superior averages about 603, the average level of the basement floors of the mill buildings being 614, a difference of 11 feet.

Under these conditions there were therefore two schemes open: first, installation of high head pump room at point, the mill service pumps being connected directly to intake, in other words a direct system; and second, location of low head pump room at the point, pumps delivering to reservoir and thence to high head pumps in pump room located at the plant. This second scheme of indirect pumping was selected, its advantages much over balancing the additional cost of two sets of pumps, buildings and accessories.

One of the most important reasons for this selection was the necessity of screening the supply to remove all foreign matter. Lake Superior water is such that filtration is not required, but due to saw mill and pulp wood operation drift is such that screening is required, and excavation would have been a considerable item were the pump house at point lowered to an elevation that would allow gravity screening from lake level. The second important advantage was that of having the high pressure pumps directly at the mill, where they would have the most efficient supervision, there being much less chance of trouble with the low pressure equipment. These two conditions determined the selection of the indirect system and its very satisfactory operation since its commencement has given every indication that the selection made was of the best.



Interior Low Head Pump House

Between six and eight million gallons of fresh water per twenty-four hours were demanded by the present plant, and the system was therefore first equipped to supply this demand. For the proposed paper mill and additional improvements eight million gallons per day additional was provided for, pipe lines, connections and buildings being designed and built for a total capacity of seventeen to twenty million gallons per twenty-four hours.

Low Head Pump House

The low head pulp house is located on a narrow point of land at the entrance of Thunder Bay, the intake extending beyond the harbor breakwater, this assuring an abundant supply of clean cool water from the lake proper. The building is an all-concrete structure 43 feet by 24-feet in plan, and providing for an ultimate installation of four 12-inch pumps with a total capacity of 16,000 gallons per minute, or about 22,000,000 gallons per day. Three of these units delivering 12,000 G. P. M. will satisfy the future demand of the plant and the fourth will serve as a spare. The pump bases are located one foot above the lake level and a 48-inch submerged steel pipe connects the suction tank with the lake. The intake is provided, at the inlet, with a coarse rack to prevent the entrance of trash, etc., and removable screens are located at the delivery end.

Hauling Intake Pipe Into Position

The intake pipe is provided with a sluice gate to prevent, or regulate, the flow of water to pump house.

Two pumping units have been installed, each consisting of a 12-inch single stage centrifugal pump with direct connected 75 H.P. 1,200 R.P.M. motors, each unit delivering 4,000 G. P. M. at 50-foot head. The pumps discharge into a 30-inch cast iron header, and a 30-inch cast iron B. & S. pipe about 1,400 feet long delivers the water to the mill service pump house. The miscellaneous equipment includes hoists and trolleys arranged for the ready removal of pumps or motors, electrical heating units to maintain the temperature safely above the freezing point, a duplicate priming system and other minor items.

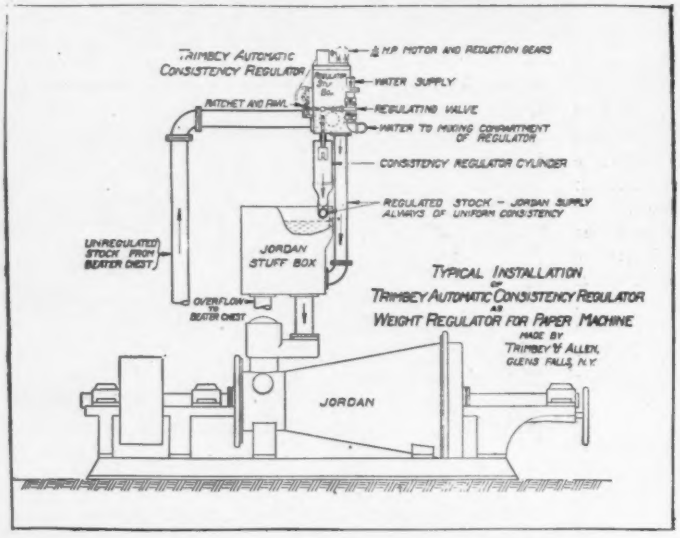
Mill Service Pump House

Power is delivered by an overhead transmission line, of three phase, 60-cycle, 550-volt, through a suitable control board, which, provides for lighting and heating circuits, and for future panels for additional motors.

Mill Service Pump House

The mill service pump house is a brick structure on concrete foundations, conforming to the type of construction used in the older buildings. It is located centrally, keeping in mind future mill buildings, to avoid unduly long lines of high pressure piping, and to secure convenience from an operating standpoint.

UNIFORM STOCK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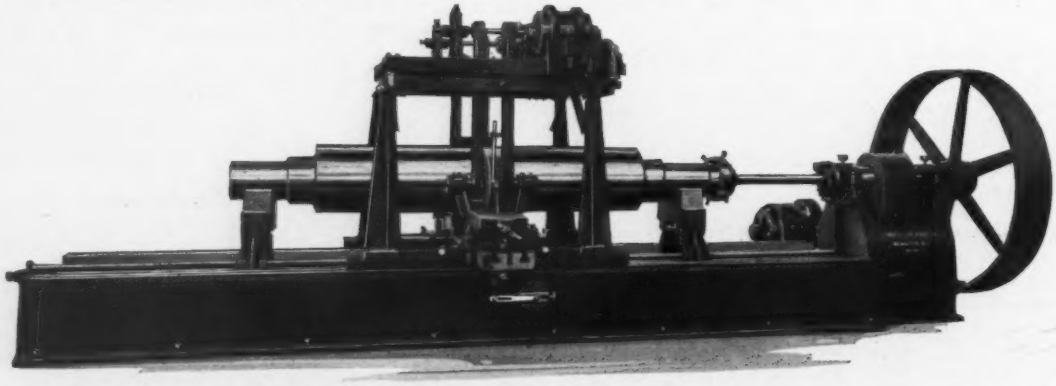

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The building is 48 by 36 feet in plan, being designed to house three 12-inch and two 8-inch pumps with a total capacity of 16,000 G. P. M. The present installation consists of two 12-inch single stage centrifugal pumps with direct connected 175 H.P., 1,200 R.P.M. motors, one of which is ample for the present demand, the other serving as a spare. The pumps discharge at 52 pounds pressure, into a 24-inch header, thence to the mill supply system.

The remainder of the equipment is similar to that in the low head pump room, but in this case the boiler house is sufficiently close to make possible the use of steam heat.

The connection to the city mains has been maintained, hence the new installation provides about ideal conditions, there being two independent sources of manufacturing water, and three sources from fire insurance standpoint. Further, an abundance of clean, cool water is assured for all time.

The Officers of the Company

I. H. Weldon is president, and S. F. Duncan, secretary-treasurer of the Provincial Paper Mills, Limited, with offices at Toronto, Ontario. Arthur G. Pounsford is manager, and A. G. Heinzki is general superintendent of the Port Arthur Division, with residence at Port Arthur. Mr. Pounsford has been directly in touch with the work at all times and by his attention and superintendence has greatly aided the engineers in carrying out this important work.

The entire system was completed in December and has since operated with complete satisfaction to both the owners and the engineers who are responsible for its installation.

Proposed Book Mill

The Provincitl Paper Mills, Limited, have started work on their new book mill, this development to be an extension to their present sulphite mill that has been operating for some years as their Port Arthur Division.

The new mill will be of concrete, steel and brick construction throughout, with wood and gypsum roofs, and will include machine room, finishing room, beater room, clay and size house, and screen room extension, together with transformer and switchboard building, machine shop and roll grinder room. The present boiler house will be extended and additional boiler capacity installed to cover the requirements of the new mill.

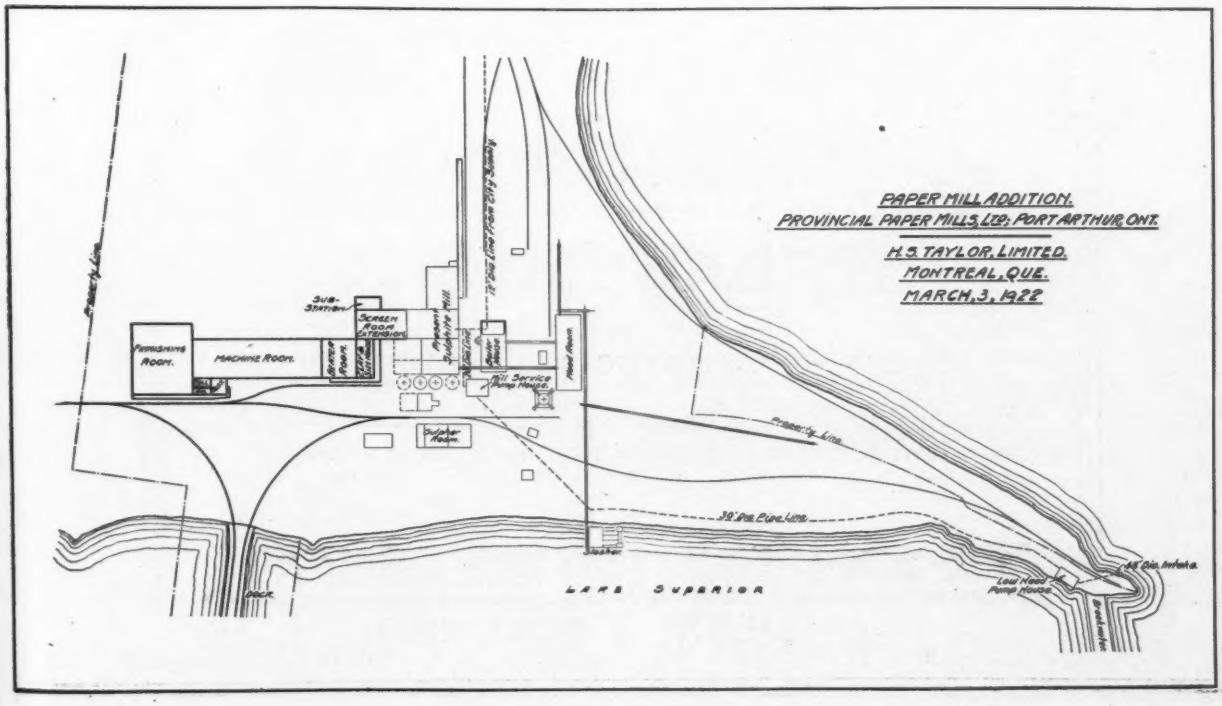
The mill is to be laid out complete for two machines, only one machine, however, to be installed now, and all equipment is to be of the most improved type and of the latest design.

The location of this mill is unusually attractive from both a manufacturing and construction standpoint. The mill site is directly on the shore of Lake Superior, and the formation is of rock throughout. Port Arthur and its sister city, Fort William, called the Gate Way of the North, include a population of some 25,000 people, insuring excellent labor conditions; wood is in abundance, and hydro-electric power is available for any demand. Both lake and railway transportation is available, Port Arthur being a division point on the Canadian Government Railways as well as the Canadian Pacific Railway.

Some 40,000 yards of rock excavation was carried out during the summer of 1921, and the site is now at grade preparatory to commencement of foundation work. A new fresh water system of approximately 20,000 gallons per minute was installed also in 1921, the new mill necessitating an increased supply, and it was therefore decided to install this new system for the entire requirements, both present and future.

The engineering and design for this new mill is being carried out by H. S. Taylor, Limited, of Montreal, Que., associated with the Management Engineering and Development Company, of Dayton, Ohio, these firms having had special experience with this type of mill.

The New York Gummed Paper Company, Manhattan, has incorporated in New York with capital stock of $45,000. The incorporators are E. D. and J. W. Ehrler, and A. F. Mayo, the attorney is M. F. Miller, 350 Fulton street.



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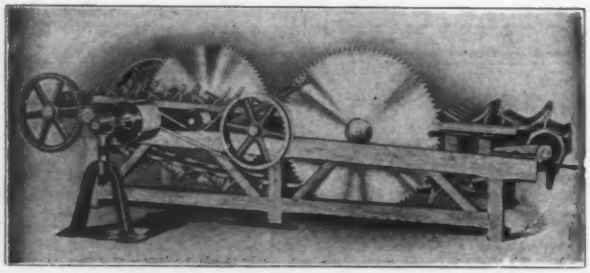

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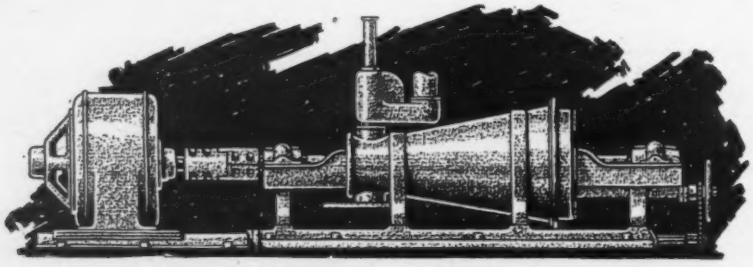

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Betterments Made to Increase Production and to Increase the Already High Standard of the Hamilton Brands—Located Near the Site of the Old Rittenhouse Mill, the First Paper Mill Built in the United States, in 1690, the Mills With Their Historical Setting Annually Attract Many Interested Visitors Who Are Always Cordially Welcomed — Contemplates Establishment of Its Own Generating Plant.

Written Especially for the Annual Number of the Paper Trade Journal by Gene Carr.

Elements of the romance of history, ingenuity in invention, exceptional natural resources and humanity enter into the story of the Riverside Paper Mills of W. C. Hamilton & Sons, located in Montgomery county just beyond the Philadelphia city limits and within close proximity to the first home of paper making in the United States. Here from 1853 on, good paper has been made by several generations which spread the name and fame of Lafayette throughout the county, but during the past year, in fact only a few months ago the locality developed into a community which could have its own post-office and with the advent of Uncle Sam's agency, the old name disappears and a new name, Miquon took its place. During that twelve-month too, extensive improvements involving the expenditure of many thousands of dollars, were made to the mill, their purpose being to increase production but even more to raise the plane of the already high standard of the Hamilton brands. After a close down of quite an extensive period during which many improvements were made, the mills have resumed production and at the middle of March were working on a 75 per cent basis with increase imminent.

Numerous Improvements During Year

The larger improvements were the introduction of a pneumatic conveyor system used in carrying wood from the chipper room to the digesters and in the unloading of lime soda ash and clay from the cars into the mixing vats, a new chip storage room so that hereafter a sufficient supply can be secured during the daylight hours to insure the operation of the machines all night long without further chipping, and the electrification of the beating engines.

All these improvements have been made under the supervision of President Freas B. Snyder and particularly of Superintendent F. J. Milon, who on December 26 last celebrated his 35th year of service with the mill. During that service of almost two score years he has risen from boy and machine tender to the head of the mechanical department; is therefore a life-long paper-maker and is competent to run any part of the plant. He still attends in person to the grinding of the rolls and to many other important details of operation; is well liked by the employees and has aided in co-operation with the executives of the company in developing the happy Hamilton family spirit. Just what that means is suggested by the fact that quite recently when there passed away at the age of 75 years, "a cutter girl," Maggie Gaul, she had a record of 57 years of service in the Hamilton plant, during the last six years of which she was a pensioner privileged to work or not as she chose, but usually at her duties. At this very time, there still is in the mill another cutter girl, Kate Hoffner, who has a record of 53 years of continuous service. During the last 40 years of which daily in summer heat, and winter snow she walks over the hills of the region, 1½ miles from home to mill and of course an equal distance from mill to home.

The new chip bin has been installed on the site of the old one, the sidewalls being raised four feet and a new steel supported roof being placed over the old one, which, however, is still in place because it supports necessary shafting. The new bin is in three sections and these supply the 15 digesters.

Through the use of the system installed by the Pneumatic Conveyor Company, it is now possible to unload in two hours a carload of lime or soda ash or clay which formerly required the work of eight men for ten hours. These materials are sucked from the car into the mixing tank where the proportions automatically are weighed and all with just the slightest human attention.

During the year, the company arranged with an outside corporation to supply the electrical current actuating the mixing tanks, but it has in contemplation the establishment of its own generating plant. Niagara beaters also are among the installations of the year and these are working most successfully.

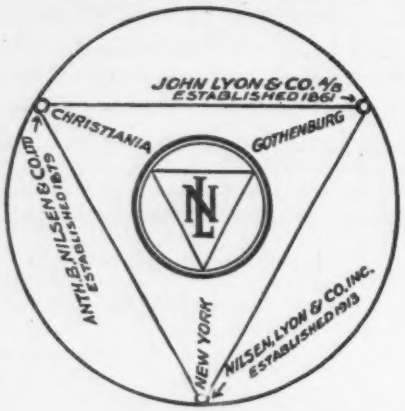
Record Runs of the Machines

Only recently was there placed prominently in the machine room a placard announcing the record runs of the four machines. These were made on November 5 with an aggregate of 113,720 pounds of which No. 1 machine on Mellow Book, 100 inch, produced 34,280; No. 2, envelope paper, 116 inch, 38,790, No. 3, pencil paper, 86 inch, 20,020 and No. 4, writing, 78 inch, 20,630. The aggregate was pleasing to the management, but it is significant that under this mill record, is recorded.

"Quality first, then production."

Pencil paper referred to in the production of machine No. 3 means a special product made in this mill and perhaps not elsewhere, used by the Blaisdell Paper Pencil Company in the production of its specialized line. A feature of the mill equipment which also is believed to be unique to it, are the horizontal digesters instead of the vertical ones, almost universally used. These digesters are lined with iron pipe through which the steam circulates and the wood is cooked in caustic soda by indirect steam heat. Superintendent Milon emphasizes the point that under this arrangement, the caustic soda is maintained unvaryingly. Another feature which gives this mill a special advantage is its wonderful water supplies for washing. This comes from one of the largest springs in eastern Pennsylvania located a few miles above the mill at Spring Mills and on which the Hamilton Company has a 90-year lease. The spring supplies 3,000 gallons per minute of clear, pure water through the company's own 16-inch pipe line at a temperature of 54 degrees season in, season out, year after year, without filtration, pumping or refrigeration. The water is crystal clear and there is in the mill a tank eight foot deep at the bottom of which is a sign to that effect and which can be read as clearly as though no water covered it. Visitors, who always are welcomed, are regaled with the draught of

"FOR THOSE WHO WANT THE BEST"



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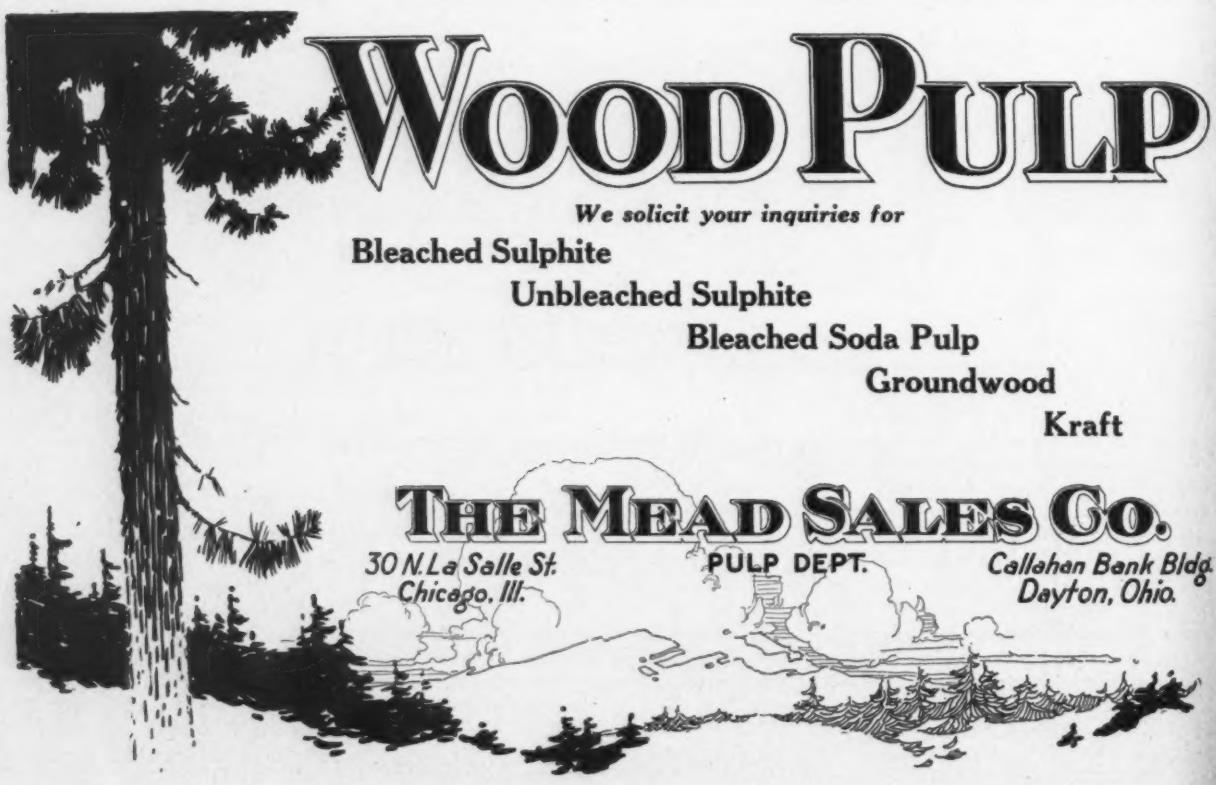

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We solicit your inquiries for

Bleached Sulphite
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THE MEAD SALES CO.
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PULP DEPT.
Callahan Bank Bldg. Dayton, Ohio.

this crystal clear fluid. Another feature of interest is the fact that in the Hamilton mills, there is no uncertain machine counting; every sheet is hand counted and full measure thus is assured.

Near the Old Rittenhouse Mill

The present mills are not far removed geographically from the site of the first paper mill in the United States. The Rittenhouse built in 1690 on Paper Mill Run, a small stream which runs into Wissahickon Creek in Germantown, just below Miquon. Quite recently, the Hamilton Company whose plant systematically is visited by all interested in paper making in Philadelphia, and particularly by students of the several classes of the Typothetæ of Philadelphia, issued for the guidance of visitors and the benefit of customers an elaborately printed and handsomely illustrated pamphlet describing step by step the processes of manufacture and giving as well a story on the traditions of the mill. With reference to these the pamphlet says, "The first paper mill in the Schuylkill Valley was built by Henry Katz, in the latter part of the 18th century, on a little stream called Trout Run, which flowed into the Schuylkill at the point where the W. C. Hamilton & Sons' Mill stands today. Mr. Katz was a former paper maker at the Rittenhouse mill. He chose this site for his mill and started out in business for himself. The mill is a thing of the past but the ruins of his homestead with the capstone bearing his initials may be seen today.

Historical Setting

"Next to build a paper mill in the valley was John Hagey, son of the watchmaker of Germantown, a famous revolutionary character. Hagey learned the paper trade in Henry Katz's mill, and eventually became the husband of the proprietor's daughter. Hagey afterward built his own mill further down the stream, on the site of our superintendent's house. Charles L. Hamilton, our vice-president, remembers, as a boy, watching the tearing down of the ruins of this mill and the construction of the first W. C. Hamilton & Sons mill. A house built by John Hagey in 1792 still stands in a well preserved condition, across Manor Road from our mill property. Further up the valley, he later built another mill and a dam for water power. This mill pond forms our present water supply for the boiler house.

"It is interesting to note that Manor Road, mentioned in the above paragraph and which adjoins our present mill property, to the north, is said to have been originally surveyed and projected by William Penn to connect his Manor house at Bristol with his possessions on the Schuylkill River.

"The mention of William Penn recalls the origin of our trade mark, when the founder of Philadelphia conversed with the Indians through an interpreter and asked for their names, they were translated into English as 'Big Man Afraid of His Horse,' or 'Little Fast Runner' or 'Black Hawk.' The Indians in turn, asked for the name of William Penn, but the interpreter could not translate it into the Indian language, because of the lack of equivalent words. Finally, the interpreter, seeing a goose quill on the ground, pointed to it and said in the Indian language Onas, signifying a Quill or Pen. But his familiar name was Miquon.

"W. C. Hamilton, founder of the W. C. Hamilton Sons Paper Co., and the father of our Vice-President, Charles L. Hamilton, received his training in the paper business at the Wilcox Ivy Mill, Glen Riddle, Pa. This famous mill was the third built in the states. It was constructed about 1729 by Thomas Wilcox and Thomas Brown.

"Wilcox had received his training in England before coming to America, and subsequently became the sole owner of the mill, died in 1772, and was succeeded by his son Mark. The Wilcox Ivy Mill made printing paper for Benjamin Franklin and he became a close friend of Wilcox and was much interested in the undertaking. After 1775 the mill was devoted almost exclusively to making government paper for Continental notes, loan certificates, and bills of exchange. It was the sole dependence of the Government, during the Revolutionary War, for paper for currency purposes. During the Continental Exhibition of 1876, held in Philadelphia, W. C. Hamilton & Sons had a paper making exhibit in Machinery Hall, under the supervision of Charles L. Hamilton. There was printed on a Campbell Press, on paper which was made on the spot, a book entitled, 'Uncle John's Centennial Story.'

"In this historical setting and with a longer record of producing good paper, our present mill stands at Lafayette station, conveniently situated on the Schuylkill River between two railroads, the Pennsylvania and the Philadelphia and Reading. The most modern machinery and equipment are used in the manufacture of paper and our force of employees comprises expert paper makers, many of whom are descendants of some of the pioneers of the industry."

News Print Imports

NEW YORK, April 10, 1922.

Editor, PAPER TRADE JOURNAL:

I have noticed on page 39 of the PAPER TRADE JOURNAL of April 6 a letter from Hugo P. F. Albrecht in which he raises some question as to the amount of German news print paper imported into the United States and quotes figures furnished by the German Syndicate with reference thereto.

We have only one official source of information upon this subject in the United States. This is the Bureau of Foreign and Domestic Commerce at Washington whose reports are available to every one.

According to these reports the first German news print came into the United States in September, 1920, and from that date until February, 1922, inclusive, the total quantity received was 66,578 tons. During the same period the imports from Sweden amounted to 74,888 tons, from Finland 28,560 tons and from Norway 27,568 tons, all of which are shown in the enclosed table.

These official figures show that the amount of paper imported from Germany compared with that from Scandinavia and Finland is materially more than suggested by Mr. Albrecht. Nearly as much has come from Germany as from Sweden and considerably more than twice as much from Germany as from either Finland or Norway.

You are welcome to reproduce these figures in your next issue is you wish to do so.

Very truly yours,

R. A. KELLOGG,

Secretary News Print Service Bureau.

The statistics regarding German and Scandinavian news print referred to by Mr. Kellogg follow:

1920	Germany	Sweden	Finland	Norway	Other Countries	Total
September	676	1,414	.....	.....	933	3,023
October	2,125	31	.....	58	.....	2,214
November	4,059	2,920	.....	1,471	.....	8,450
December	14,206	5,268	2,797	839	404	23,514
1921						
January	4,061	1,991	2,912	5,612	327	14,903
February	5,642	694	417	2,858	63	9,674
March	3,740	5,600	5,358	1,229	62	15,989
April	1,329	3,622	1,763	522	670	7,906
May	1,669	37	9	2,314	21	4,050
June	97	2,600	1,062	56	743	4,558
July	4,586	2,344	11	.....	994	7,935
August	4,289	5,797	3,894	2,163	389	16,532
September	4,920	5,791	2,490	1,093	189	14,483
October	4,140	5,405	1,469	180	144	11,338
November	2,295	5,416	1,110	1,736	720	11,277
December	2,170	9,635	2,166	2,430	291	16,692
1922						
January	3,476	5,452	839	2,376	127	12,270
February	3,098	10,871	2,263	2,431	212	18,875
Totals	66,578	74,888	28,560	27,368	6,289	203,683
Average for 18 months						11,316
Average for last 7 months						14,495

Howard Bond

Howard Ledger

"The Paper of Many Uses"

Manufactured by

THE HOWARD PAPER COMPANY, Urbana, Ohio

CENTRAL MANUFACTURING COMPANY

THE QUICK SERVICE HOUSE KALAMAZOO, MICH.

Manufacturers of

High Grade Brass and Bronze Screen Plates and Dandy Rolls

OLD PLATES
CLOSED AND RECUT

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WATER MARKING

Secure Our Prices

We Can Please You

Super Calenders
Breaker Calenders
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MADE FROM SPECIALLY PREPARED STOCK
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FOR FINISHING ALL KINDS OF
FINE AND COATED PAPERS
SUPER AND FRICTION FINISH

Successors to the Granger Foundry & Machine Co.

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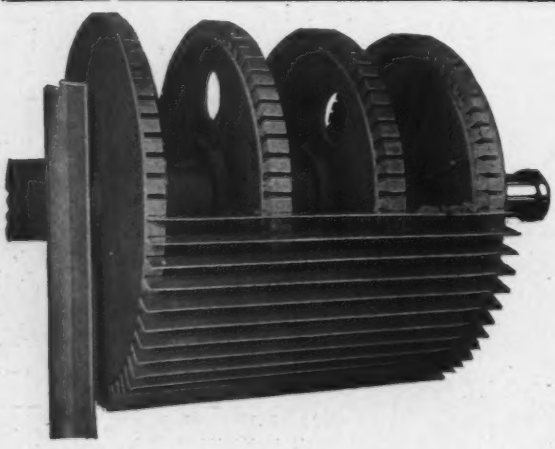
PROVIDENCE, R. I.



Dilts Machine Works, Inc.

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Manufacturers of

BEATING and WASHING ENGINES
FLY BARS—BED PLATES—
MACHINE KNIVES

Our new KEYED TYPE BANDLESS ROLL is the final result of Many Years of Experience.

May we not tell you about its many advantages?

News Print Mill of St. Maurice Lumber Co. Ready

Plant of the Subsidiary of the International Paper Co. at Three Rivers, Ind., Is a Model of Efficiency in Every Respect—Will Have Four 164-Inch Bagley & Sewall Fourdriniers—Electrical Energy for Operating the Mill Comes from the Shawinigan Falls Water & Power Co.—Plans Carried Out Under Direction of A. H. White, Chief Engineer of the International Paper Co. — An Ideal Location.

Written Especially for the Annual Number

Just north of the juncture of the St. Maurice and the St. Lawrence rivers in the most picturesque setting in the province of Quebec, is situated the new Three Rivers mill, belonging to the St. Maurice Lumber Company, a subsidiary of the International Paper Company. Ground was broken for the mill in August, 1919, giving new enthusiasm to the industry and bidding fair to create a new epoch in the progress of paper manufacture.

There is little wonder that the interests responsible for the erection of the groundwood pulp mill, the sulphite pulp mill, and the news print paper mill now look with pride upon the work and in their just enthusiasm vouchsafe that at Three Rivers lies the most modern pulp and paper making plant now existent.

Ideal Location

The location is ideal in a practical way no less than it is perfect scenically. The waterways in close proximity afford excellent facilities for handling the logs as they are at first received and as they leave later on after being transformed into the paper of commerce. The utmost in efficiency has been attained in the method of importing electrical energy from Shawinigan Falls, in the prolific use of labor-saving devices, and the masterful layout of the several departments to avoid wastage of time and labor. The Canadian Pacific Railway runs up to a shipping platform of solid concrete that is itself a feature found in connection with few other paper mills. Each section of that mill has a door opening flush with the platform so that incoming and outgoing freight is handled with a minimum of expended effort.

Much credit for the superb technique maintained in the plans throughout the series of mills is due to A. H. White, chief engineer of the International Paper Company.

The Log Haul

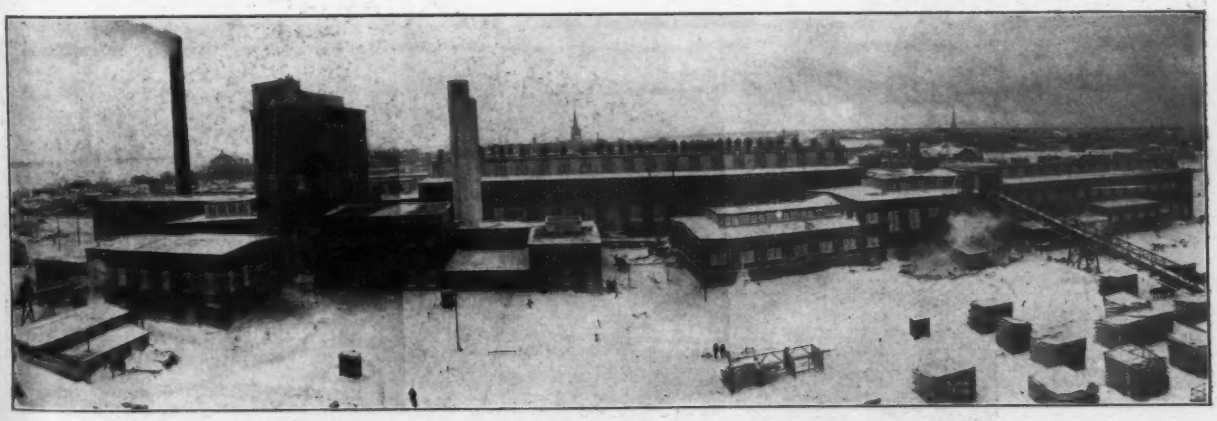
In describing the equipment of the plant for storing and preparing the wood for the mill, first to be mentioned is the log haul, 20 feet wide by 81 feet long, constructed by Ruther & Pringle. There is one slasher, equipped with four 60-inch saws, constructed by Ruther & Pringle, where the logs are cut into four-foot lengths and carried by chain conveyor to three big barking drums. The drums are 12 feet in diameter and 46 feet 3 inches long, constructed by the Canadian Ingersoll-Rand Company. Bark and refuse from the drums is carried to the shavings boiler house by belt conveyors, the whole system revealing a perfect example of the ultra-modern tendency to cut down expense by elimination of all conceivable wastage. The equipment just described has in actual operation taken from the St. Maurice River, barked, washed and stacked in piles, 13,000 logs in 10 hours. The record is a good one and speaks for itself.

The shavings boiler house is equipped with six 150-h.p. horizontal tubular boilers, each designed for 125 pounds steam pressure.

Progress of the Logs

From the barking drums the logs are passed on by means of chain trough conveyors to storage piles, three in number, with a capacity of 16,000 cords each. The logs are piled by three steel log stackers which take them from the conveyors and distribute them along the top of the pile in a superhuman way. The stackers themselves, built by the Dominion Engineering Works, Ltd., are 125 feet high, reinforced by portable extension conveyors that perform the function of many hands. Other chain trough conveyors move logs from the three piles to both the sulphite mill and the groundwood mill. A Green Bay barker has been installed to take care of any logs imperfectly barked.

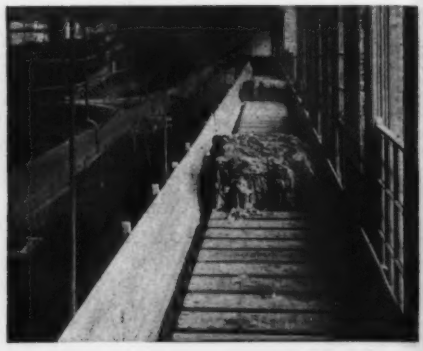
No wordy description can adequately describe the Three Rivers mill. One should direct the beam of his own eyes upon the structures and their highly scientific equipment to gild the whole as it



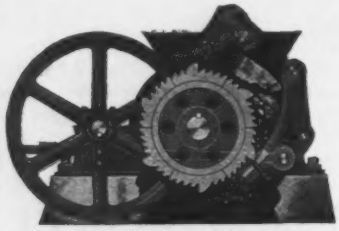
News Print Mill of the St. Maurice Lumber Co. Just Completed at Three Rivers, Que.

Jeffrey Flat and Round Link Chain Conveyer handling cooked straw over beaters in paper and board mill.

A series of Plain Chains, for carrying logs direct to stackers, or diverting to barkers thru openings in side of trough.



Jeffrey Standard Apron Conveyer for handling Bales of Rags, Pulp Rolls, etc.



The Jeffrey Single Roll Crusher reduces lump or run-of-mine coal to stoker sizes in a single operation.

Pivoted Bucket Elevator—Conveyer for handling coal and ashes.

Radial Type Loader for handling Coal, Gravel Crushed stone, and similar loose materials.

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The Road to Economy in the Carrying of Logs, Pulp Wood, Pulp Laps, Straw, Bark, Coal, Ashes and other material in Pulp and Paper Mills.

JEFFREY PRODUCTS:

Conveyers, various types; Pulp Wood Stackers; Portable Loaders; Portable Belt Conveyers; Coal and Ashes Handling Systems; Coal Crushers; Chains; Buckets; Sprockets; Wheels; Gears; Shredders; Industrial Locomotives, etc.

Our Engineering experts will be glad to assist you in the selection of the type of equipment which will most economically meet requirements in your plant.

THE JEFFREY MFG. CO. 931 North Fourth Street **Columbus, Ohio**

Elevating Pulp to height of 50 feet with a Jeffrey Portable Log Stacker.

Jeffrey Wire Cable Conveyers are especially adapted for long haulage of pulp wood, and working with Portable Log Stacker.

should be gilded. Following the course of the rough wood log, the sulphite mill is next in order. In the sulphite mill is found a washing drum, 12 feet in diameter by 15 feet 3 inches long, built by the Canadian Ingersoll-Rand Company.

Another chain trough conveyor carries the wood to the chipper building, itself equipped with two 88-inch Carthage chippers, two Sherbrooke chip screens, 60 inches by 18 feet, and one horizontal wood splitter for 4-foot wood.

Along to the Digesters

The chips proceed automatically from the chipper building to a vertical chip elevator, 93 feet high, and thence to a chip bin with a capacity of 40,000 cubic feet, where they are dumped.

Also, there are two steel digesters, 15 feet in diameter by 47 feet in height, built by the Chicago Bridge and Iron Works. Ample provision has been made for the installation of a third digester. In the blow-pit building there are two pits of 13,000 cubic feet capacity, built of concrete and iron and capable of caring for two digester charges. Provision has been made for the construction of a third pit of equal size when it may become expedient to expand.

Underground, between the blow-pit building and the sulphite screen room, is a large sulphite stock tank, where the stock is agitated continuously. From this tank the stock is pumped to two Impco knotter screens, located in the sulphite screen room, and then is passed through four Sherbrooke centrifugal screens. There is one 96-inch Rogers double press wet machine with two extra washers, an inclined decker for the sulphite stock, one Trimbey & Allen stock mixer, and four E. D. Jones Majestic Jordan engines.

Acid Plant by G. D. Jennsen Co.

In the acid plant, designed and built by the G. D. Jennsen Company, of New York City, is manufactured the calcium bisulphite liquor used for digesting the wood. The plant consists of the standard Jenssen equipment, rotary sulphur burner, combustion chamber, spray cooler, and the usual two concrete acid towers. The towers are 9 feet inside diameter and 94½ feet high, holding over 400 tons of limestone, which is lifted to their top by a 2-ton Otis Fensom elevator enclosed in a concrete shaft comprising the third of the clover leaf design of the towers. The capacity is 100 tons of sulphite pulp every 24 hours. The operation of this acid system is essentially so simple that only one operator is needed to manipulate a water valve and the controller of a variable speed motor to have the right test of the raw acid at all times.

The Groundwood Mill

In the groundwood mill are twelve big magazine grinders, built by the Watrous Engine Works Company. Each of the big grindstones is 62 inches in diameter with a 54-inch face and has two magazines 4 feet 3 inches by 4 feet 8 inches by 16 feet high. The grinders are driven in pairs by 2,400 h.p. synchronous motors, 3 phase, 60 cycle, with a voltage of 2,200.

In the same mill are also one silver screen, three Impco knotters, with space for one more; two rifflers, 27 feet long by 18 feet wide, with space for one more; five first screens of the centrifugal type, and two second screens. There are twenty deckers, built entirely of concrete, 40 inches in diameter, with a 96-inch face, and there is space for ten more of these deckers to be installed when business warrants it. There are three save-all deckers, 36 inches by 72 inches, and one save-all. The groundwood deckered stock is pumped into the machine chest in the sulphite screen room.

Spacious Machine Room

The spacious machine room is next in line, with four 164-inch Bagley & Sewall Fourdriniers. The room itself, or what is more nearly two rooms, has high ceilings and is light and airy. The machines are unhooded.

Each machine is equipped with the following: Three rotary Bird screens; one 10-plate flat screen; a Fourdrinier wire 164 inches wide by 100 feet long; one breast roll 18 inches in diameter by 166 inches wide; one Millspaugh suction couch roll 30 inches in diameter; one first press with a 30-inch diameter Millspaugh suction roll at the bottom, the top roll being 26 inches in diameter; one second press, with both rolls 26 inches in diameter; one third press, with both rolls the same as the second press, and one fourth press, with the bottom rolls 26 inches in diameter and the top roll 24 inches in diameter.

There are six felt dryers, 48 inches in diameter by 162-inch face; one dryer, 28 inches in diameter by 162-inch face, and forty dryers, 60 inches in diameter by 162-inch face.

The Farrel calender stack is equipped with eight rolls 12 inches in diameter, one 20-inch roll, and the bottom roll which is 28 inches in diameter. The calenders are equipped with Warren doctors. There is one uniform speed reel, 46 inches in diameter; one slitter, and one Warren winder, with drums 28 by 12 inches in diameter. Each machine is driven by the sectional electric machine drive of the General Electric Company, one turbo generator set developing 500 kilowatts, 250 volts direct-current for each machine. The machines are also equipped with the Shehan rope carrier and the Pope air appliances.

The other miscellaneous equipment in the machine room includes two 10-ton Dominion traveling cranes and eight 3-ton electric roll hoists. In the basement are two air compressors, 16 inches by 10 inches by 12 feet, and two "broke" beating engines, with tub dimensions 27 feet by 10 feet by 8 inches.

Screen Room Extension

In the screen room extension there are two inclined deckers, two Claflin refiners, one continuous beater, two 10-plate flat screens, one standard Jordan engine, one beater engine, with tub dimensions 27 feet by 10 feet by 8 inches, and one Turbo generator set of 100 k.w., which generates the power for the mill wrapper machine at 250 volts direct current.

There is one wrapper machine, with cylinders 48 inches in diameter and 96 inches long, two presses, one first dryer 24 inches in diameter by 86 inches long, sixteen face dryers 48 inches in diameter by 86 inches long, one calender stack with five rolls 12 inches by 82 inches, and one roll 20 inches by 82 inches, one calender stack, with one roll 14 inches by 82 inches, eight rolls 10 inches by 82 inches, and one roll 20 inches by 82 inches.

Electric Energy from Shawinigan Falls

Electric energy for the mill comes from Shawinigan Falls Water and Power Company. It is delivered at the mill in three-phase, 60 cycles, and 66,000 volts; later reduced to 2,200 volts for the grinders, and 550 volts, general mill power voltage, for the 350 motors of various sizes that are installed throughout the plant.

There are two sets of transformers at 12,000 k.v.a. in the main transformer house and one set at 600 k.v.a. in the secondary transformer house. The mill is illuminated at 110 volts by power taken from the 550 volt lines by single-phase transformers. There are ninety pumps installed in the various departments of the mill of various sizes and for various duties.

The St. Maurice River supplies the water for the mill, which is purified by the Norwood Filter System, having a capacity of 20,000,000 gallons in 24 hours. This system comprises twenty sections of sand filters, 8 by 30 feet, each pumped throughout the plant.

The boiler of the house is equipped with eight 500 h.p. Babcock & Wilcox water tube boilers supplied with heat by crude oil burners. Four big reinforced concrete tanks have been built underground with a capacity of 150,000 barrels, in which the mill's fuel oil supply is stored. The chimney of the boiler house is 12 feet in diameter and 200 feet high, built by Alphons Custodis.

The Little Falls Paper Company, New Windsor, Orange County, New York, has been incorporated with capital stock placed at $250,000. The incorporators are S. L. Holden, R. W. Spencer and L. J. White. The attorneys are Scott & Sweet, Newburgh, N. Y.

Friction—
the Unseen Enemy of Production in Your Plant

Accept with our Compliments—

The money that Friction costs you

IF you are coming to believe that it is a costly blunder to tolerate preventable friction in your plant—a costly blunder to waste power to overcome friction—a costly blunder to pay for friction in burned-out bearings and other repairs and replacements—then you will agree with this:—

Oils keep down friction, and the oils that keep down the most friction are the oils that save the most money.

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To help you to determine beyond question what oils will reduce the most friction in each engine and machine in your plant, we offer to make a Lubrication Audit for you without charge.

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This will give you an exact picture of the lubricating conditions in your plant and the correct oils to meet those conditions.

VACUUM OIL COMPANY

No matter what the size of your plant, a Lubrication Audit will point the way to lower operating costs. Are these times when you can afford to be headed in the opposite direction?

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Explained Step by Step (in Condensed Outline)

INSPECTION: A thoroughly experienced Vacuum Oil Company representative in co-operation with your plant engineer or superintendent makes a careful survey and record of your mechanical equipment and operating conditions.

RECOMMENDATIONS: We later specify, in a written report, the correct oil and correct application of the oil for the efficient and economical operation of each engine and machine. This report is based on:—

(1) The inspection of the machines in your plant.

(2) Your operating conditions.

(3) Our 56 years of lubricating experience with all types of mechanical equipment under all kinds of operating conditions throughout the world.

(4) Our outstanding experience in manufacturing oils for every lubricating need.

CHECKING: If, following our recommendations in this audit, you install our oils, periodical calls will be made to check up the continuance of the desired results.

For the above free service address our nearest branch office.

Domestic Branches:

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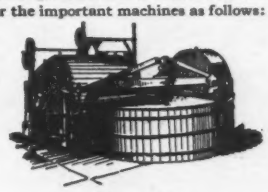
A Lubrication Audit

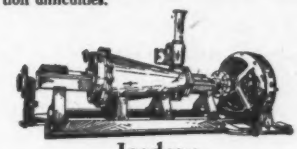
in the *Paper Industry*

would point out the Correct Lubrication for the important machines as follows:



Beaters

Beater bearings, generally unnecessarily hot, will run cooler if the stock leakage is eliminated and oiling is regularly attended to. The regular use of **Gargoyle D. T. E. Oil Extra Heavy** overcomes beater lubrication difficulties.



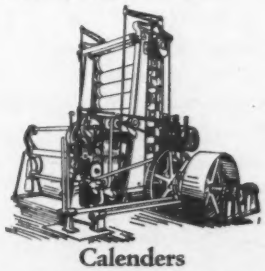
Jordans

Because of the high speeds and heavy pressures which are always present, and the side pull on bearings when belt driven, it is necessary to use a heavy bodied oil. For this purpose we recommend **Gargoyle Etna Oil Heavy Medium.**

Paper Machines

For bearings of the paper machine, subjected to induced heat from steam used for drying, an extra heavy bodied oil is required such as **Gargoyle D. T. E. Oil Extra Heavy.**

The rolls at the wet end subjected to moisture and heavy pressure demand a compounded oil which will resist the washing te.. 'ency and maintain a perfect oil film. We recommend **Gargoyle D. T. E. Oil Heavy X** for these specially trying conditions.



Calenders

Paper machine production is directly dependent upon uniform speed. Calender bearings are subjected to heavy pressures and high frictional heat. The regular application of Gargoyle D. T. E. Oil Extra Heavy insures uniform speed, and consequently minimizes "broke."

VACUUM OIL COMPANY

Editorial

Vol. LXXIV New York, April 13, 1922 No. 15
FIFTIETH YEAR

Fifty Years Ago and Now

The PAPER TRADE JOURNAL, with this issue, celebrates its Golden Anniversary. Founded May 27, 1872, by the late Mr. Howard Lockwood, an experienced paper man, and one of the pioneer trade journal publishers, this publication was the first of the trade journals now in existence devoted to the interests of the paper industry, and the PAPER TRADE JOURNAL and Lockwood's Directory of the Paper and Allied Trades, the first issue which was published by Mr. Lockwood in 1873, have always continued to be the leading publications in their fields.

The big revolution in paper making naturally started shortly after the invention of the paper making machine in France by Robert in 1799 and its introduction and perfection by the Fourdinier Brothers in England in 1802. The really great developments in the industry, however, have all occurred during the lifetime of the PAPER TRADE JOURNAL. While the principles of paper making have continued the same as when the first Fourdrinier machines were placed on the market, the increase in the speed and the size of these machines during the past fifty years has been truly marvellous. When the JOURNAL was started, in 1872, it is stated as a surprising fact that while the ordinary speed of the Fourdrinier machine was from sixty to eighty feet per minute, there was then one machine running at the rate of one hundred and seventy-five feet per minute, producing twenty-five tons of paper weekly.

The great advance in the art of paper making can best be appreciated when it is mentioned that a number of Fourdriniers in the United States and Canada are now in successful operation on both news print and kraft paper, running at one thousand feet per minute and that this speed will doubtless soon be increased. The largest news print machines in the world, only recently installed at the mills of the Abitibi Power and Paper Company in Canada, measure 232 inches in width and produce 98½ tons of news print per day each, running at 700 feet per minute. The successful operation of these giant machines at such high speed has been made possible only through the application of the electric drive which came into general use in the paper field comparatively late, being retarded by the difficulty of making the application to such monster pieces of machinery as the Fourdriniers. All the difficulties of the early days in the use of electricity in paper making, however, seem now to be overcome and the possible developments opened up by its successful application furnish food for decidedly interesting speculation.

When the first issues of the PAPER TRADE JOURNAL were appearing wood pulp was just being introduced in this country as a raw material by the Pagenstecher Brothers, Warner Miller and others. Previous to that time rags, straw and, to a lesser extent, some other fibrous matter had been solely employed. Ridiculed at first, as many new ideas are, the use of wood as a raw material for paper made rapid progress and has now assumed proportions that were altogether unthought-of half a century ago. So great indeed has it been employed as a raw material for the several varieties of pulp that vast forests in the East, which at first seemed ample to furnish supplies of wood for all times, are beginning to show signs of exhaustion and this fact for some years past has caused serious attention to be given to the matter of reforestation by both individuals and interested organizations. Among other commendable work the American Paper and Pulp Association has of late, through its secretary, Dr. Hugh P. Baker, an experienced forester, been encouraging interest in the paper industry in this matter with results that are bound to be increasingly appreciated.

With the increasing difficulty in obtaining wood, and its consequent appreciation in price, renewed interest has been directed to the investigation of new fibers for paper making. This search usually has not been attended with very profiable results, for, while it is a well appreciated fact that paper can be made experimentally from almost any fibrous matter, nothing has as yet been discovered that approaches wood for producing paper on a commercial scale. About the only new material of importance that has been found from which paper can be manufactured profitably since the introduction of wood pulp is cotton hull fiber. In the past few years a number of mills which utilize this fiber in the manufacture of pulp have been started in the South and it seems to have established itself as a recognized material for paper making.

With the great expansion of the industry, the invention of new processes, and the introduction of more ingenious machinery, it was natural for the industry in the course of time to appreciate the importance of paying more attention to the technical side of paper and pulp making, which, in the early days, had been altogether too much neglected.

The movement for greater interest in the technique of the industry took its first tangible form in the organization of the Technical Association of the Pulp and Paper Industry, first as a section of the American Paper and Pulp Association and a few years ago as a separate association. It now includes more than 600 members and its affairs are managed by Mr. W. G. MacNaughton, a technically educated man and a trained paper maker, as secretary. To encourage the work of the association, the PAPER TRADE JOURNAL recently arranged to print each week a technical section which is conducted by Secretary MacNaughton.

The passing of the old order of things has been reflected also in the attention that has been paid in the past few years to education for the employees of paper and pulp mills. An instance of the growing importance of this idea is the work that is being done by the Vocational Educational Committee. Organized only a few years ago, under the secretaryship of Mr. R. S. Kellogg, this committee has already expended considerably upward of $40,000, subscribed through the generosity of representative paper and pulp firms, in the editing and publishing of text-books for mill employees. Similar progress in vocational training has been shown in few fields and the paper and pulp industry cannot fail to profit from it greatly as time goes along.

The surprising growth of the industry in the past half century cannot be brought out in a comparison of the number of establishments in 1872 and the present, as the mills in the earlier period

had not assumed the vast size of some of the plants today, but is plainly brought out in some other statistics. The value of the products produced by the mills in 1872, for instance, was only $66,505,825 as compared with $788,059,377 in 1899, the latter figures being from the United States Census report.

In 1872 there were engaged in the industry 13,427 male and 7,700 female adults and 922 children whose wages aggregated to $9,552,146, while in 1899 the average number of wage-earners had grown to 113,759 and 11,005 salaried employees whose pay aggregated $165,643,386. The value of the mill plants was estimated at $35,564,500 in 1872 and the capital represented in the industry was $905,794,583 in 1899.

This look backward certainly reflects great credit on the captains of the paper industry who have passed away. Their work was well done and they have been succeeded by able and courageous men, which has been demonstrated during the recent trying times.

Fundamentally, the industry, as a whole, is on a sound basis and so far as may be judged from the present aspect of things, it may safely be asserted that the industry will continue the very satisfactory expansion of the past half century.

An Unsatisfactory Year

The paper industry has been passing through one of the most distressing periods of its history. This fact is brought out in detail in the reviews of the various branches of the trade and of the more important centers in the industry in this country and abroad which are printed elsewhere in this issue. This decline which started in 1920 showed a tendency to discontinue in the fall of 1921, but the improvement was short-lived and prices have been tending downward pretty persistently ever since this brief betterment ceased.

News print not only because of its large tonnage but because ot the fact that the newspaper publishers, the main customers for this particular variety of paper, are in a position to spread any propaganda that suits their purpose, has naturally been most in the limelight. It is fair to state, however, that less misinformation has been printed about news print than was the case a year or more ago when spot news print, due to a stampede among the publishers, reached 18 cents in some cases and commonly sold at 14 cents. In contrast to the stories that were printed when this was occurring, the news during the past year has been of constantly falling prices for news print. While the contract price for news when the last annual number of the PAPER TRADE JOURNAL was issued, was 5 cents, it is now 3½ cents, with spot news quoted at the same figure. Even at these prices, however, some mills are idle and only a comparative few of them are as busy as they would like to be.

What is true of news print, holds for most other lines of paper. A tendency to re-act favorably was shown in most departments of the market last fall, but unfortunately this did not continue. Kraft paper probably has shown the most improvement of all. Chip board which sold at $25 per ton when the low point was reached in the break of the market has reacted to about $35 per ton at the present time, but in spite of this reaction, the market has been in a most unsatisfactory condition ever since the big slump occurred. Book paper has also been unsatisfactory. Brief spurts in fine papers caused frequent hope of permanent betterment, only to be succeeded by the unfavorable situations which have prevailed for so long.

With the slow demand from the paper men, the market for raw materials also naturally has been most unsatisfactory. During the year there has been so little demand from the mills, and prices offered have been so low in consequence, that collectors have been disinclined to make their usual collections. Just at the moment, there is some betterment, but the market is far from normal.

The idle paper mills or mills only partially employed have also had the effect on the pulp market that was to be expected. Prices declined throughout the year. Bleached sulphite which sold at 8 to 9 cents in January, sold at 4 to 4½ cents in November. Groundwood which at the beginning of the year sold at $70 to $80 per ton had fallen to $28 to $30 per ton by December, with other varieties of pulp showing a proportionate decline. Some improvement has taken place of late, but the market is still far from satisfactory.

Wage re-adjustments have been more or less frequently reported throughout the year, and labor, apparently realizing the position in which manufacturers are placed has pretty uniformally accepted these readjustments with good grace. Judging from the present relations of selling prices, to the cost of production, these re-adjustments unfortunately will have to continue.

Not unimportant certainly among the causes which have helped to influence the current cheap prices of paper, are the absurdly low prices at which some papers have been imported into the country from abroad and because of this fact, it is greatly to be hoped that Congress will grant the protection that the American paper makers need to insure them a chance to earn a decent livelihood.

Comparatively little construction has taken place in the industry during the past year. Mills, however, have improved their financial standing through bond issues and otherwise and have taken advantage of the lull in activities to make improvements to their plants in order to be in a position to share as greatly as possible in the revival of business which all paper men believe cannot be much longer deferred.

The liquidation in all departments of the industry has been complete and thorough and when the long looked for normalcy returns, the trade will be able to expand along the most healthful lines.

TO TRY DEXTER SULPHITE SUIT IN NEW YORK

Suit for cancellation of the contract under which he paid $3,500,000 for the property of the Dexter Sulphite Pulp and Paper Company, Dexter, N. Y., brought by William Randolph Hearst against Dr. James E. Campbell and Dr. Clarence W. Campbell, mill owners, is to be tried in New York city some time this week. Several attorneys and witnesses from Watertown, N. Y., will participate in the trial. There are several other ramifications to the case which are the basis for other law suits.

The sale of the Dexter property was one of the big paper mill deals of the war time period in this section. In addition to the enormous price paid, the Campbell brothers were retained to manage the mills and they were to be converted into news print plants. This was not completed when Mr. Hearst withdrew and started action to rescind his contract on the grounds of fraud in the sale. He claims that his agent, C. F. Zittell, was party to a deal which brought himself a liberal commission, in addition to paying large sums to others for helping engineer the deal.

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Trade Association Banquets

Dinner of the American Paper and Pulp Association Thursday Evening Is Largely Attended and Featured by Speech Making of Unusually High Order—Technical Association of the Pulp and Paper Industry Holds Its Usually Enjoyable Dinner Tuesday Evening at the Hotel Astor—National Paper Trade Association Dines Wednesday Evening at the Waldorf-Astoria — All Brilliant Events.

The forty-fifth annual dinner of the American Paper and Pulp Association took place April 13 in the Grand Ball Room of the Waldorf-Astoria. A reception was held at 7.00 o'clock and the banquet scheduled for 7.20 was very nearly commenced at the appointed time.

W. J. Raybold Presides

About 900 were in attendance, an unusually large and representative assemblage considering the present state of unsettlement in the paper industry in general. W. J. Raybold, president of the Association, presided as toastmaster. Other officers of the Association are Henry W. Stokes, vice-president; Arthur L. Pratt, vice-president, and Dr. Hugh P. Baker, executive secretary.

The reception committee was comprised of Col. W. E. Haskell, chairman; W. E. Beacraft, F. M. Boyer, W. F. Brunner, Dr. James E. Campbell, T. W. Dunn, P. S. Fiske, G. S. Gaylord, J. W. Hurlbut, L. C. Jeffress, W. D. Judd, Edw. Kerr, Jr., H. Kurniker, C. W. Lyman, J. B. Nash, A. H. Nevius, J. P. O'Brien, Judson G. Rosebush, D. A. Smith and L. T. Stevenson.

The banquet committee, composed of Alexander Calder, chairman; Martin Cantine, Charles L. Chapin, C. H. Coye, L. H. Davey, J. J. C. Downey, J. D. Goldberg, W. Lloyd Heath, Phillips Kimball, L. I. Kuhe, M. E. Moyer and J. H. Stannard, are to be heartily congratulated upon having staged one of the most successful affairs of its kind that the paper trade has yet had the privilege of enjoying. The gathering was put in good humor early in the evening with the singing of numerous popular songs for which the words were supplied by stereopticon slides, obviating the customary song sheets.

Prefacing his introduction of the chief speaker, the Hon. Frank B. Willis, U. S. Senator from Ohio, President Raybold gave a lively address bearing on the activity of the Association, interspersed with bits of glowing humor, all of which was received with salvos of applause indicating a very hearty appreciation and understanding throughout the audience of paper manufacturers with their wives and guests.

Senator Willis Speaks

Senator Frank B. Willis in part spoke as follows:

It is a curious fact that industry moves in cycles. For centuries it was supposed that paper could be made only from cotton and linen rags. Rags from gutters and junk heaps—rags reeking with filth and disease were eagerly sought from Peking to Philadelphia as materials for milady's delicately perfumed note paper; and then in 1867 the world, taking advantage of the discoveries of Fennerty and Keller, began to make paper from woodpulp just as the Moors did 800 years before in Spain, and the cycle was complete. This essential industry, so honorable in history and ancient in lineage, has in the few decades since its re-discovery grown to immense proportions.

Some Statistics

The latest available data shows 718 establishments engaged in the manufacture of pulp and paper or both with an investment of capital amounting to $550,000,000; these plants employed 90,000 men, paid out $53,000,000 in wages and turned out an annual finished product of $335,000,000. It will be observed that it takes approximately two years' product to equal the fixed investment; this indicates a very high investment of capital as compared with other industries and constitutes one of the serious problems of the business. The turnover is too slow, the dependence on local conditions of timber supply too great and the risk too serious to make investment attractive. I saw one paper machine at work in Wisconsin that cost $300,000. Such machinery is too bulky and costly to be moved from place to place and hence a constructive program to supply essential raw material in the immediate vicinity must be adopted.

Must Keep Industry at Home

If the pulp and paper business is permitted to become ambulatory it will walk clear out of the country and across into Canada. We must keep it at home where it belongs so far as economically possible. Canada is a vigorous, friendly competitor. She can produce mechanical pulp 23 per cent lower and chemical pulp 19 per cent lower than it can be produced here. Your Association has been active and far-sighted in preparing a program as helpful to the general economic conditions of the country as it is essential to the maintenance of the pulp and paper industry as part of the symmetrical economic life of America. In brief, the plan contemplates National and State legislation looking to surveys and classification of forest lands, both public and private, and appropriations for protection, care and management of forests, and the distribution of forest-planting material; further appropriations for acquiring by National and State governments, either by direct purchase or by exchanging timberland for cut-over land, regions suitable for permanent forests; appropriations for tree-planting research and investigation; revision of the tax laws in the direction of offering an inducement to private forestry; and cooperation between private owners and Government in fire protection.

Cooperation in Business

As business men you have succeeded because you have required co-ordination, co-operation and economy in your business; you could never pay dividends if each of your departments were a rival of the other, and if there were no relation between income and expenses. The Government of the United States is a great business, the greatest in the world, and it should be and must be run according to business principles. Efficiency must be promoted and economy wrought even if those hiding behind bureaucratic camouflage are loud in their denunciations of a program of efficiency and economy which cuts off the payroll 2,000 persons per week. Heavy moss-covered tradition will have to yield in the interest of better service and a tax reduction of $800,000,000 in a single year. No sane business man or manufacturer could expect to keep out of the hands of a receiver if he did not establish and maintain in his own business a budget to require co-ordination and bring outgo on speaking terms with income. To make this essential reform in

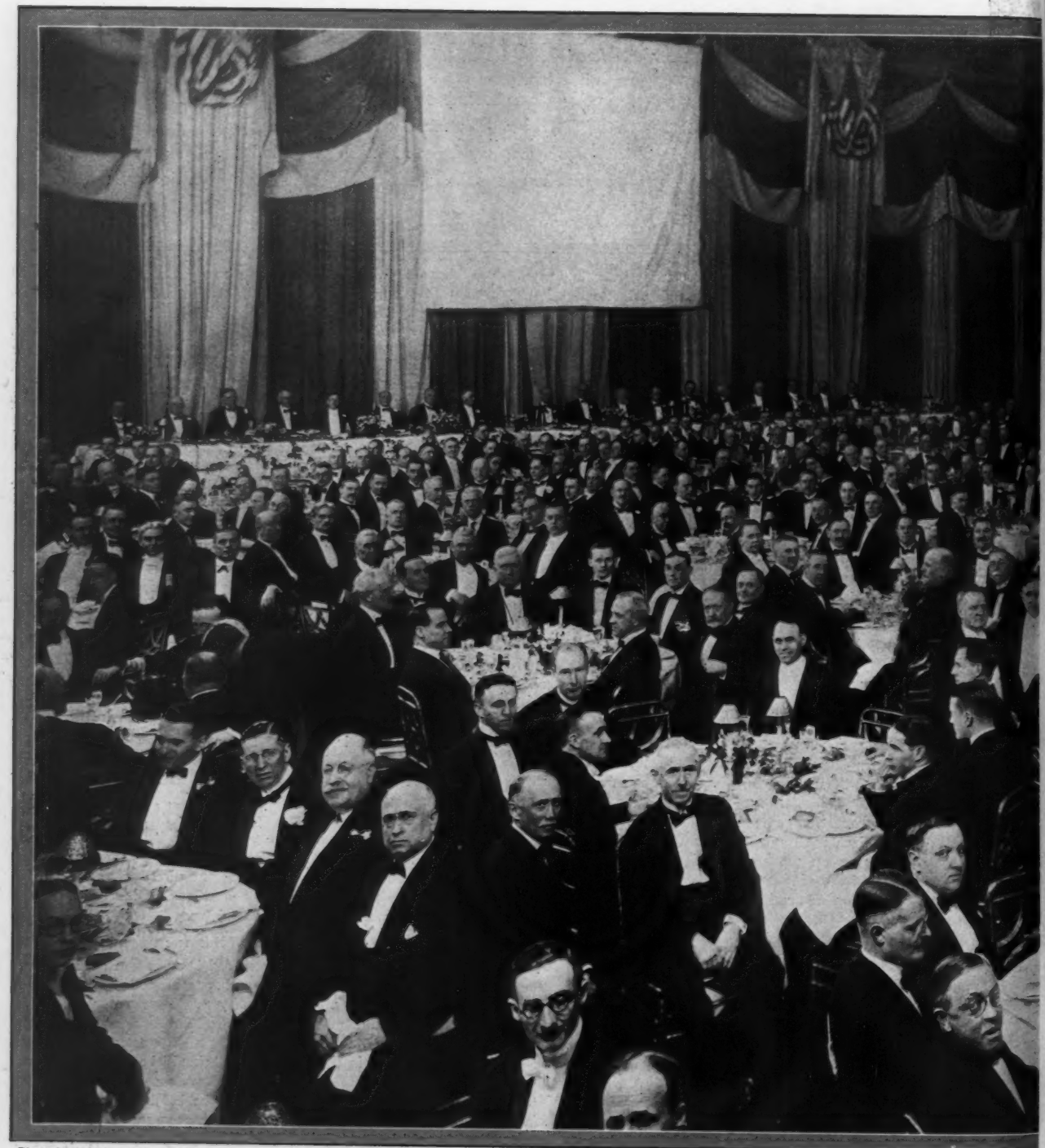

Photo by Drucker & Baltes Co.

PICTURE TAKEN AT THE FORTY-FIFTH ANNUAL BANQUET OF THE AMERICAN PAPER AND PULP

Association at the Waldorf-Astoria Hotel, New York, Thursday Evening, April 13, 1922.

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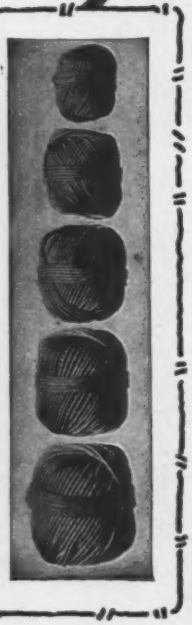

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CORDAGE

national finance possible Congress enacted a law providing for the establishment of a budget system. The Executive wisely selected to take charge of this new work an aggressive, masterful, hard-hitting business man and soldier, General Charles Dawes of Ohio and Illinois.

Reducing Running Expensse

Coincident with the passage of the Budget Act, the President of the United States, for the first time, actively assumed his responsibility as the head of the business organization of government, and directed his efforts towards securing a reduction in the running expenses of the Government for the present fiscal year, notwithstanding it was the intention that the Budget Law should commence to be effective in connection with expenditures for the fiscal year 1923. The President therefore called together in June, 1921, all the members of the business organization, made up of heads of departments and announced a policy of retrenchment in unnecessary expenditures. At this meeting there was a direct imposition of Executive pressure and policy upon the business organization as a whole. It had immediate results, and at the end of thirty days the President was assured a saving of $112,000,000 out of current appropriations, which amount was put aside in a reserve fund, which has since been increased.

In the meantime, for the purpose not only of continuing intelligent imposition of Executive pressure and plan upon the routine business of Government, but also for the purpose of proper current handling of business under one head, the President established by executive order a number of co-ordinating agencies, acting under Executive authority and concerned with the transaction of business in terms of the Government as a whole as distinguished from forty-three separate, rival, power-seeking departments and independent establishments now existing. Without going into detail the result of this effort has been most gratifying to the friends of economy and efficiency. At the beginning of the year the departments and establishments estimated that the fiscal requirements of the Government for the present fiscal year ending June 30, 1922, would be $4,550,000,000. By continuing through the Bureau of the Budget and co-ordinating agencies, Executive pressure and plan, the President was able to announce to Congress in December that the expenditure of the Government would be kept down to a figure of $3,968,000,000, a reduction of $582,000,000. Under the co-ordinating agencies there were effected interdepartmental transfers, in about four months, of over $100,000,000 of property, preventing corresponding recourse to the outside market, and thus saving the taxpayers' money.

The expenditures for the first nine months of the present fiscal year to March 31, 1922, amounted to $2,904,037,946.59. Prorated over the entire year this indicates that the Government is well within the sum of $3,968,000,000, which was estimated in December, 1921, as the amount necessary to carry through the year; ours is the only important Government in the world actually living within its income and paying its debts.

Routine Business Reorganized

The routine business of Government has been reorganized, duplicate purchasing co-ordinated so that different departments no longer bid against each other in the same market and actually buy at different prices on the same day. Extensive work with current results is now being done in simplification of routine business, and establishment of the principles which govern all properly run private organizations. The Budget Bureau succeeded in sending in its estimates promptly at the opening of Congress in the new form authorized by law. The sum of $3,968,000,000 expenditures for the year represents not only a decrease of $582,000,000, from the estimates of the amount necessary made by the departments and establishments at the beginning of the year, but a decrease of over $1,500,000,000 from the actual expenditures for the fiscal year 1921. This represents actual saving of more than $4,000,000 per day, $160,000 every hour, or more than $2,500 every minute of every hour of every day in the year. More business in government is getting results. When an eminent political leader said a few years ago that $300,000,000 per year could be cut from Federal expenses without injury to the service he was looked upon as a doctrinaire and theorist, yet the application of just plain business sense such as you use in your own affairs, has wrought a saving of public funds five times $300,000,000 in twelve months. Government can help business some, but business can help Government more.

Edward J. Cattell; statistician, Philadelphia, was the concluding speaker.

The affair came to a most successful conclusion as the hour of midnight drew nigh and upon leaving each and every one could not help but feel that the occupation of the evening had been one of the greatest pleasure and value withal. The dinner concluded the convention with the exception of a few miscellaneous meetings scheduled for Friday, April 14, and a few odds and ends of business matters to be completed, and it concluded most magnificently what had been pursued throughout with that finesse that spells only the utmost satisfaction which comes from the knowledge of a good work completed in a fashion hitherto unapproached.

TECHNICAL ASSOCIATION BANQUET

The annual banquet of the Technical Association was held Tuesday evening in the North ballroom of the Hotel Astor. The occasion was a spirited one from start to finish thanks to the efforts of F. T. E. Sisson of the Racquette River Paper Company, in charge of the entertainment features, and to the capable toastmastership of Judge Charles F. Moore, whose annual witticisms were undimmed. The 300 present were treated to the usual excellent dinner rendered unusually palatable by the ebb and flow of a spirit of optimism rarely equalled and altogether welcome as marking the first notches in a new phase of good business lately ushured in.

J. C. Wright, elected a director of the Federal Board of Vocational Education on last Tuesday, was the first speaker taking Vocational Education for his subject, he emphasized its great importance at the present day, and showed how advancement might be secured in the work. O. F. Bryant, president of the Technical Section of the Canadian Pulp and Paper Association, and L. M. Alexander, president of the Nekoosa-Edwards Company gave short speeches which were well received.

Frank Gilbreth, who has lately returned from Czecho-Slovakia, cited that country as an example to the United States in efficient methods of attacking business and technical problems. He stated that the Czechs make a systematic effort to do the utmost possible to perfect each trade and are doing everything possible to carry on present development from where it has left off in other countries. Their policy spells competition which must be met by American business men if this country is to continue to excell.

On account of illness in his family Dr. Otis W. Caldwell, Director of the Lincoln School, New York, who was expected to speak on the "Scientific Mind" was unable to be present but his place was very ably filled by Dr. David Snedden, professor of sociology at Teachers College, Columbia.

Dr. Snedden told of the great progress made in "selling" Vocational Education during the last years. He expressed agreeable surprise at learning what generous strides the American Paper and Pulp Association has made in developing the subject. In discussion the fundamental aspects of Vocational Education Dr. Snedden said that the 60,000,000 to 70,000,000 men and women workers in the country were all educated somehow in schools of one type or another. Five or six per cent of the workers get their start toward production efficiency in vocational schools. Five or six per cent more get their start under well organized apprenticeship. The balance of about nine per cent that is left unaccounted for, obtain their practical experience in the "University of Hard Knocks" by divers "picks up methods." Under the conditions of

ANNUAL DINNER OF THE TECHNICAL ASSOCIATION OF THE PULP AND PAPER INDUSTRY AT THE ASTOR HOTEL, TUESDAY EVENING, APRIL 11, 1922

speed, efficiency, and specialization today a worker educated in a hap hazard fashion stands a very poor chance of succeeding unless he happens to be an exceptional character. Present day practices reveal a startling waste in such methods and it is to put the individual worker upon his feet and to make the collective co-operation of all workers more effective that vocational education is being stressed today. The movement reflects the spirit of Democracy and efficiency and is certain to succeed with the ample backing of capable business men.

Judge Moore brought the banquet to a close by congratulating President Williamson for what he deemed the finest technical banquet.

"No speaker spoke too long and all spoke well," and all felt the thrill of having attended a most successful affair.

NATIONAL PAPER TRADE BANQUET

The twelfth annual banquet of the National Paper Trade Association of the United States took place at the Waldorf-Astoria Hotel, Wednesday evening, April 12. About 360 diners both men and women were present to enjoy one of the best programs yet arranged and judging from the warm approval tendered each act of the entertainment all enjoyed themselves to the utmost.

A very handsome smoking package done by Louis Sherry was given every banqueter and the tables were further decorated with unusually attractive menu and program combinations embellished with the seal of the National Paper Trade Association. The tables bore large bouquets of tulips in opalescent hues that blended harmoniously with the subdued colors draping the hall.

Herring's Hawaiians played during the dinner and at times accompanied other entertainers with their mellow and exotic tunes direct from the shores of Waikiki. The program was as follows: (1) Miss McKinnon, quick change artist in songs and dances, (2) Byron and Langdon in their latest sketch, entitled "The Woman Dodger," (3) Miss Swanwood in her late dance creations assisted by her jazz band, (4) Mr. Ford with humorous selections, (5) Miss Doris Wilson & Co. in a high-class singing specialty entitled "Thru The Looking Glass," (6) Fonti-Bonti-Brothers, European Eccentric Musical Comedians, (7) Oscar Lorraine, Broadway's great entertainer, and (8) The Phonograph Trio, champions of Syncopated Harmony.

Dancing followed in the Astor Gallery until a late hour terminating a most enjoyable evening.

PAPER CHANGES IN TARIFF BILL

The tariff bill, after months of consideration by the Finance Committee has at last been introduced in the Senate. A number of interesting changes have been made in Schedule 13, the paper schedule. While of course news print paper and mechanical wood pulp were left on the free list, chemical wood pulp was made dutiable at 5 per cent, in spite of the protests to the committee of the newspaper publishers. The committee has changed Schedule 13 and now calls it "Pulp, Papers, and Books," having added pulp to the name of the schedule. Paragraph 1300, the new chemical wood pulp section as reported reads as follows:

"Paragraph 1300. Chemical wood pulp, unbleached or bleached, 5 per centum ad valorem: Provided, That if any country, dependency, province, or other subdivision of government shall forbid or restrict in any way the exportation of (whether by law, order, regulation, contractual relation, or otherwise, directly or indirectly) or impose any export duty, export license fee, or other export charge of any kind whatever, either directly or indirectly (whether in the form of addition charge or license fee, or otherwise), upon printing paper, chemical wood pulp or wood for use in the manufacture of wood pulp, there shall be imposed upon chemical wood pulp, when imported either directly or indirectly from such country, dependency, province, or other subdivision of Government, an additional duty equal to the highest export duty or other export charge imposed by such country, dependency, province, or other subdivision of Government, upon either an equal amount of chemical wood pulp or an amount necessary to manufacture such wood pulp, or an amount of printing paper ordinarily manufactured from such chemical wood pulp."

In Paragraph 1302 the committee has added "wallboard," and has made the following exceptions "except pulpboard in rolls, for use in the manufacture of wallboard."

In Paragraph 1303 on filter masse, etc., the committee has increased the rates from 1½ cents and 15 per cent to 1½ cents and 25 per centum and on papier mache the committee increased the duty from 23 per cent to 30 per centum. In Paragraph 1304, the tissue paper section the committee has struck out "paper and all papers not specially provided for in this section" and inserted in lieu thereof;

"Paper, india and bible paper, condenser paper, carbon paper, coated or uncoated, bibulous paper, pottery paper, tissue paper for waxing, and all paper similar to any of the foregoing, not specially provided for, colored or uncolored, white or printed." In the same section the committee has added "weighing over twelve and one-half pounds and less than eighteen pounds to the ream, 4 cents per pound and 15 per centum ad valorem";

In Paragraph 1307 the committee has added the following proviso at the end of the paragraph; "Provided, That in computing the duty on such paper every one hundred and eighty-seven thousand square inches shall be taken to be a ream." In Paragraph 1308, paper envelopes the committee has stricken out a certain portion and inserted the following; "and in addition thereto, if plain, 5 per centum ad valorem; if bordered, embossed, printed, tinted, decorated, or lined, 10 per centum ad valorem; if lithographed, 30 percentum ad valorem."

Section 1659, the news print section which is on the free list stands exactly as it passed the House. No change at all was made in the rag pulp section, No. 1641 but in the mechanically groundwood pulp section Paragraph 1610 was inserted the following, "including pulpboard in rolls, for use in the manufacture of wallboard."

Foreign Valuation Basis

Otherwise than the changes mentioned above no changes have been made in the bill as it passed the House. It must be taken into consideration, however, that the bill as reported this time is on the basis of foreign valuation while the House bill was on the basis of American valuation.

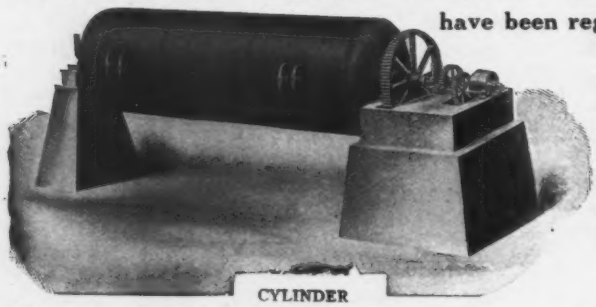
INLAND PAPER BOARD CO. FORMED

The Inland Paper Board Company, Inc., Norwich, Conn., is a new organization formed to operate the paper board mill in the nearby village of Versailles, which mill was formerly controlled by the Federal Paper Board Company, of New Jersey.

The new concern, it is stated, has no connection with any other paper board manufacturing concern. Its property is on the New York, New Haven & Hartford Railroad, and it includes 620 acres of land, a modern, two-machine paper board mill, ample mill yards and dwellings. Some of the company's product goes to the Atlantic Carton Corporation in this city.

The company is directed by William G. Shortess, Frank Mousley and H. T. Brown, and the financing includes the issuing of 3,000 shares of preferred, of par value of $100 a share, and 8,000 shares of common, of no par value, with voting power for all stock.

"BIGGS" ROTARY BLEACHING BOILERS



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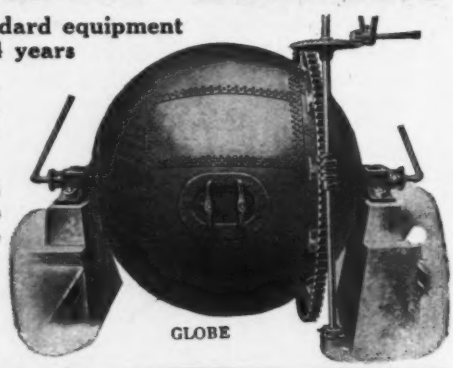
Write for prices



GLOBE

The Biggs Boiler Works Company **Akron, Ohio, U.S.A.**

TRADE JENKINS MARK Jenkins Bros

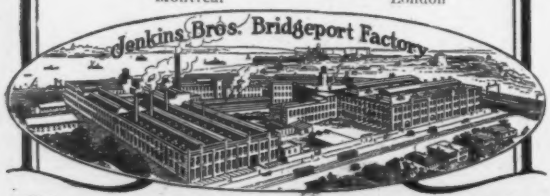
Prestige and an obligation

National prestige throws an obligation upon a manufacturer, for a good reputation, once established in the eyes of the public, must be constantly and assuredly maintained.

We are ever mindful of this obligation and also of the fact that dependent upon valves are convenience, fuel economy, and safety.

Valves for all requirements. Genuine carry the Jenkins "Diamond" and signature.

JENKINS BROS.
New York Boston Philadelphia Chicago
Montreal London



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PAPER

"It more than Wraps– It Advertises"

We believe that 99 44/100 % of those who now remember how Kraft Paper came into popular use, will also be able to tell about the success of Ad-Pax Papers. It's coming!

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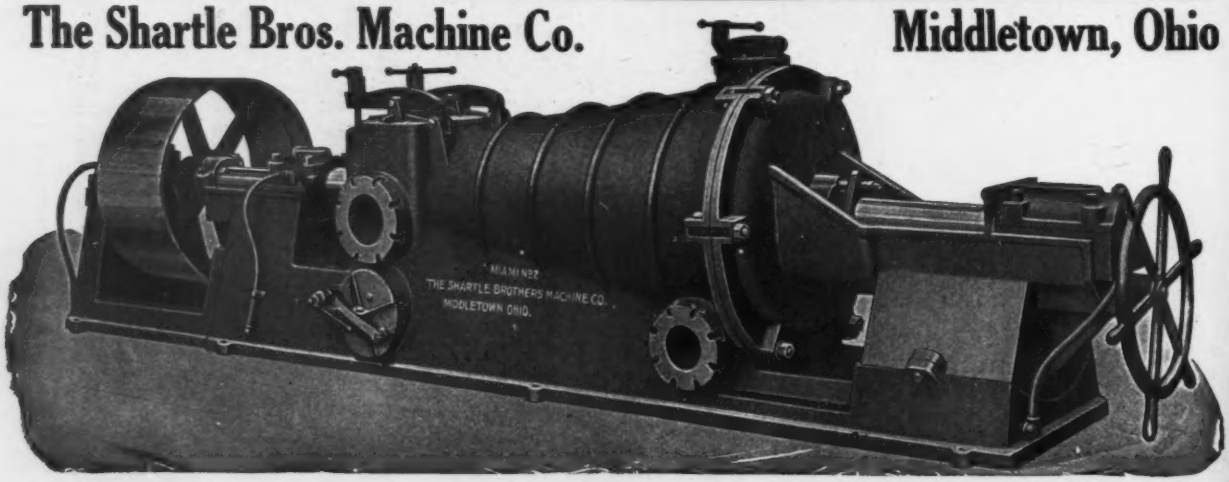
320 Broadway, New York

The Shartle Bros. Machine Co. Middletown, Ohio



MANUFACTURERS IN CONVENTION

American Paper and Pulp Association Holds Forty-Fifth Annual Meeting at the Waldorf-Astoria Hotel, New York.

W. J. Raybold, of the B. D. Rising Paper Co., Housatonic, Mass., Is Re-elected President — Says Depression in the Industry During Past Year in Pulp and Pulpwood Shows Loss of $70,000,000 — Outlook Now Is Growing More Encouraging—Representative Men of the Industry Make Addresses and Reports—Dr. Hugh P. Baker Reviews Work of Year—Affiliated Associations Meet and Elect Officers.

The very great success of the Forty-fifth Annual Convention of the American Paper and Pulp Association held during the week of April 10 at the Waldorf-Astoria is of special significance this year, as it marks the first stages of a new cycle of prosperity in the paper industry. Possibly there was never a time when the comparison of notes and the exchange of confidences by paper men from the four quarters of the North American field lent so much buoyancy to the feeling of optimism and confidence that has slowly been gaining ground during the late months. The convention arrived at the psychological moment and by reason of its unprecedented brilliancy and the great volume of encouragement dispersed at its different sessions will long remain in the memory of those present as the finest assembly yet convened in the history of the Association.

Sectional meetings played a more important rôle than ever in the convention this year. Although their number has increassed until they would be expected to be cumbersome and subject to considerable overlapping, the very efficient manner in which they were scheduled and carried out made them the center of attraction and developed sufficient interest to draw sizeable audiences at every session.

Last year's innovation for presenting a "cross section" of the entire industry by means of a number of ten-minute talks was continued this year with even more effective results. The interlinking of the different sections of the Association was carried out to such an extent that there was an idea of unity and coordination about the whole that added much to the value of the entire conference.

Questions of labor and transportation were discussed at length with the purpose in view of formulating more unified policies that would enable manufacturers to work together better and thereby meet more squarely the unusual and difficult conditions now obtaining.

While optimism was the watchword of the convention no flamboyant prosperity was predicted. The consensus of opinion was that Germany will have to be put on her feet before economic balance can be regained. With Germany revived it in turn could assist Russia in her troubles, which in their present state of complexity exert a demoralizing effect on business on both sides of the ocean.

W. J. Raybold, President

Manufacturers spoke much of losses being sustained at present in their production, but the vast majority were hopeful in spite of the dark present and by reason of the mutual interchange of difculties a great deal of substantial morale was built up that should operate toward the exertion of more energy in the solution of the difficult problems of the day and to greater activity in general.

As usual the Woodlands Section held some very active meetings fairly brimming with excellent addresses of a meaty nature followed by an animated discussion in which a large number took part. The meetings started on Tuesday morning on the stroke of ten and continued till late in the afternoon with only a short intermission for lunch. President Raybold and the presidents of the respective groups as well circulated about through the various meetings with a word of greeting now and then, adding much to the spirit of buoyancy manifested in all quarters.

One of the things manufacturers care least to do is to talk about their own business, but a surprising amount of frank discussion developed at various stages wherein constructive criticism was freely passed, thereby adding much of profit and value to the several gatherings.

That the Forty-fifth Annual Convention was a great achievement no one questions. It is hoped that in the near future results of a nature to strengthen the paper business will evolve in encouraging volume.

THE NEW OFFICERS

The following officers were elected for the ensuing year:

President—W. J. Raybold, B. D. Rising Paper Company, Housatonic, Mass.

Vice-President—Henry W. Stokes, York Haven Paper Company, York Haven, Pa.

Second Vice-President—Arthur L. Pratt, Allied Paper Mills, Kalamazoo, Mich.

Secretary-Treasurer—Hugh P. Baker, New York.

Committeemen at Large—Louis Bloch, Crown Willamette Paper Company, San Francisco, Cal.; Col. W. E. Haskell, International Paper Company; Sidney Mitchell, United Paper Board Company, New York.

THE PRESIDENT'S ADDRESS

W. J. Raybold, president of the association, made the following address:

The Forty-fifth Annual Convention of the American Paper and Pulp Association is a fitting time to make some comments on the growth and importance of trade associations in general and the American Paper and Pulp Association in particular. These comments with some brief remarks on business conditions, past and present, and a briefer glance at the future, will comprise what our Secretary has chosen to designate on the program "the President's Address."

I wish to pause here long enough to pay a tribute to my predecessor in office, George W. Sisson, Jr. His administration will long be remembered by the very able, annual addresses he delivered. They rose to the rank of real state papers. I commend particularly to your careful rereading his address delivered one year ago.

The ability to organize into groups for political and social betterment marks the difference between the human animal and the lower forms of animal life. Almost as far back as the beginning of written history there are evidences of trade associations. You will recall that the Apostle Paul had trouble with the Silversmiths' Craft of Ephesus, and their leader, one Demetrius, proposed to silence him, charging that his teaching hindered the sale of their products. This was at the very opening of the Christian era.

Medieval Europe saw the rise and fall of the guild system, and now in these latter days we are witnessing a very important development in national trade ganizations in the United States.

There are at the present time about one thousand trade organizations in the United States. Approximately two hundred of these are national in their scope and activities. This large growth is strong evidence that the modern business man has at last learned that *co-operation* and not *competition* is the real life of trade. Emmet Hay Naylor in his recently published book on trade associations states this very clearly as follows:

"The modern trade association is one result of the business world's realization that unrestricted competition is unnatural and fallacious and that constructive, intelligent competition, together with studied co-operation, is not only desirable but essential to industrial welfare. . . . The old conception was that industrial success was built on the failure of others; the new conception is that every failure in an industry is felt disadvantageously by every member of that industry and by the consumer as well, and that the temporary profits enjoyed by the victor generally cannot offset the damage and retrogression suffered by the industry as a whole."

Co-operation of the right kind does not destroy healthy competition. It does on the contrary encourage fair competition by giving the business executive accurate knowledge of trade conditions. This knowledge he can use for constructive purposes in his own business without destroying the business of his neighbor. Some one has recently said that the modern business world needs "Co-operation regulated and not competition compelled."

Large corporations or so-called "trusts" are manifestations of man's desire to obtain the benefits of co-operation; the practices of some of them may have gone beyond the bounds of good morals or proper legal limits, but this fact of itself is not a valid argument against the principle of co-operation.

The importance of trade organizations and co-operative methods are being recognized in high places. Herbert Hoover, Secretary of Commerce, in his recent correspondence with Attorney-General Harry M. Daugherty said:

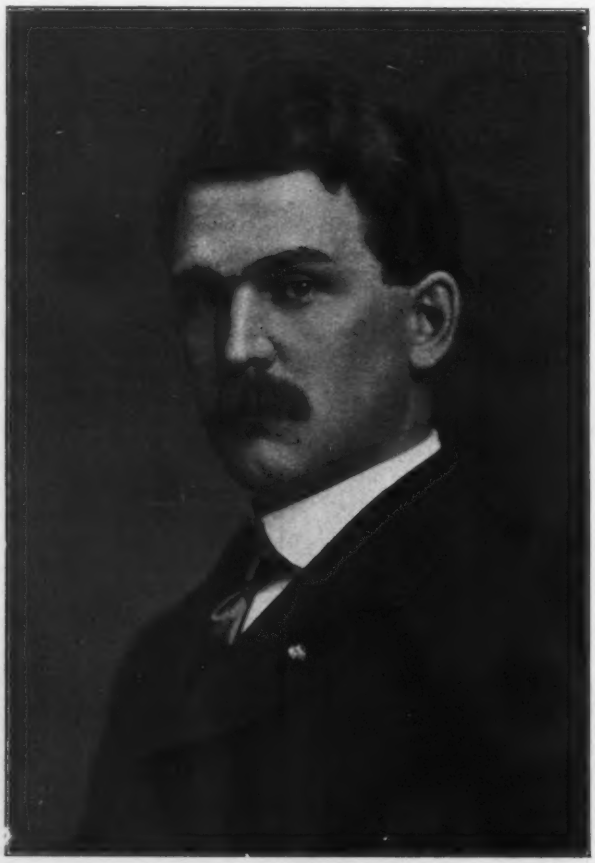
"It is with much earnestness that I claim there is propriety, generally speaking, in trade associations. Their lawful field of endeavor is large, and their activities work for promotion and advancement of the public welfare and for progressive economic organization."

Mr. Justice Brandies and Mr. Justice McKenna, in their dissenting opinion on the Hardwood Lumber case, said:

"Intelligent conduct of business implies not only knowledge of trade facts but an understanding of them. To this understanding editorial comment and free discussion by those engaged in the business and by others interested are aids. Opinions expressed may be unsound; predictions may be unfounded; but there is nothing in the Sherman law which should limit freedom of discussion, even among traders."

This dissenting opinion was concurred in by Mr. Justice Holmes.

In my opinion the development of trade organizations along proper lines has been a



DR. HUGH P. BAKER, EXECUTIVE SECRETARY OF THE AMERICAN PAPER AND PULP ASSOCIATION

great step in advance and points the way toward the proper use of the principles of co-operation in contrast to the old pools and trusts. As the Reserve Bank System, by creating co-operation among the individual banks, prevented a financial panic, so I believe the national trade associations, by encouraging co-operation among their members, have prevented industrial disaster.

The American Paper and Pulp Association has kept pace with the modern development of the organization idea. Organized in 1878 it has had a long and useful career. There are only three older national associations. It is interesting to know that the oldest trade association in the United States is the Writing Paper Manufacturers' Association, which was organized in 1861. The American Paper and Pulp Association's form of organization has changed as conditions have changed, which is an evidence of life and growth. In its present form it is a federation of twenty affiliated associations and sections, each active in its own field, but all working together on larger general matters. As conditions change, the form of organization should continue to change.

Mr. Sisson, in his address last year, suggested that a committee be appointed to study the present form of organization and suggest improvements. This committee was appointed and will report today certain changes that we believe will strengthen the organization. The changes have been thought out very carefully and ought to have your approval. The American Paper and Pulp Association desires, and we believe deserves, the hearty support of every manufacturer of paper and paper products.

Business Conditions

It would serve no good purpose to go over in detail the history of the last year and the year before. It is sufficient to say that they were the two worst years the paper industry has seen in a generation, but they are behind us and we can look forward with courage unimpaired. It has been a source of great satisfaction to me that I could occupy the office of President during one of these trying years. It has brought me into intimate relations with many of you who have been bravely bearing the burden and heat of the day. Surely the men of the paper industry are good losers. I have seen men facing large losses from month to month with stout hearts and smiling optimism, and never a one who was really discouraged or disheartened. I have come to think of these years as years of gain instead of loss. After all, it is not the greatest success to make much money; the real success is the building of character. What does it count if we have lost a few dollars? We have gained courage, hopeful optimism, confidence in ourselves and in our associates. These are the things that enrich life. Ruskin once said that

"A hundred men can talk where one can think. A thousand men can think where one can see. To see clearly is poetry, art and religion."

He might well have added:

"To see clearly and act courageously are the two essential principles of a successful business man's life."

These years have proven that we have many men of this character in the paper industry.

There are great signs of encouragement for the future. Building is starting up in many centers. Non-employment is decreasing. Railroads are increasing their earnings, and are coming into the market for new equipment. The price of agricultural products is advancing, thus increasing the buying power of a large part of the population. The steel business has steadily improved and is now on a basis of 75 per cent. tonnage, which is more than equal to 100 per cent. product before the war. Foreign exchange is improving. The banks are in good condition, so that money is available for new enterprises.

Our own industry has been thoroughly liquidated, both as to costs and selling prices. Stocks are low in the hands of merchants, printers, and the public. The mills at present are receiving orders at the rate of fully 75 per cent of normal capacity, all of which is being consumed. A small movement all along the line to build up stocks would soon put the mills onto a 100 per cent basis. This is bound to come in the near future. So let us forget the things that are behind and press forward with courage to the better things, with full confidence in ourselves, our associates, and our associations.

The following report was read by Dr. Hugh P. Baker, secretary-treasurer:

As with other trade associations throughout the country, this association has reflected the depressed business conditions. The officers of the association have made consistent and constant effort to economize in expenditures, and, at the same time, to make the association serve the industry more effectively.

Future possibilities in trade association work are indicated by the way in which associations have continued to received the support of industry even when many of their own activities have been cut down or eliminated by the manufacturer. If there has ever been a time when trade associations could be of service to the manufacturer it has been in these months of difficult business conditions. In the older associations of the industry, where the possibilities of association work have been thoroughly appreciated, there has been even more interest in association work than during the abnormally good times of eighteen months ago. It is hoped and believed that the experiences of manufacturers in associations during the difficult year just passed will make for a stronger working together of all of the elements of the industry.

Membership Campaign

There are a few organizations of men where a 100 per cent. membership means as much as in a trade organization. The value of the work of the association is affected pretty largely by the ability of an association to turn out accurate and complete statistics as to production, shipments, stocks, etc., covering all of the manufacturers represented by that group. Furthermore, a 100 per cent membership reduces the average expense for all.

When your secretary came into the association two years ago he attempted to analyze the activities of the association and the opportunities ahead and he felt that one of the first activities should be an aggressive membership campaign. Such a campaign was laid out on paper, but as the plan developed it was seen that the association was somewhat too indefinite in its service, and possibly had too little of direct service to sell. Therefore the idea of an aggressive campaign was laid aside temporarily and every effort has been made the past two years to develop the effectiveness of the service of the association. Two new activities have been added to the association which have very large promise in the way of direct service. There are the Woodlands Section and the Information Service, both of which will be mentioned later.

In the way of direct service the association has greatly strengthened its contact with the Federal Government and with State Legislatures. It has also gotten in much closer touch with other national associations of manufacturers, largely for the purpose of profiting by the experiences of these other associations, but also that we might reflect more accurately to our membership those business activities outside of the paper industry which may have very great influence upon the paper industry. It is believed that the association, in its more effective co-ordination of the work of the Service Association, that is, the Technical, Cost, Salesman and Superintendents' Associations, with the more direct activities referred to above, is now in position to offer service to every paper manufacturer in the United States.

With your help it is planned, therefore, to begin at an early date an aggressive membership campaign which will bring non-member mills into their respective groups or directly into this association. Only with your help can this be done in any satisfactory way.

Committee Activities

In the report of last year emphasis was laid upon the fact that the work of such an association as this must be carried on more or less through standing or special committees. A recommendation was made that there should not be the usual standing committees but rather that when a certain piece of work was to be accomplished in the association there should be a special committee, which, upon the completion of the special piece of work, should be discharged. A considerable number of standing committees, presumably active upon different phases of work of the association, may make an excellent showing in a secretary's report. However, where a standing committee is in existence and where it is not definitely engaged in work for the association, there cannot help but be a feeling on the part of the members of that committee that if the committee itself is not actively at work that possibly the association is not at work.

Several very active special committees have been at work, some of them during most of the year. The Tariff Committee, of which Henry W. Stokes is chairman, has done a great deal of work and work of very disinct value to the industry.

The Committee on Forest Conservation has continued its activities and as Frank L. Moore, a past president of this association, is not now directly connected with the paper industry, Geo. W. Sisson, Jr., past president of the association, accepted the chairmanship of that committee.

Two special committees have been appointed in connection with contact of the industry with Washington. The Advisory Committee from the Paper Industry for the Paper Section of the Bureau of Standards, which was appointed late last year, has been reorganized with Arthur H. Nevius as chairman, and has been representing the industry in a very careful way in such matters as classification of paper, standardization, and especially in the way of interpreting to the Bureau of Standards the problems confronting the paper industry.

Through the aggressive work of several members of the Advisory Committee from the Paper Industry for the Bureau of Standards, and others, Secretary of Commerce Hoover was interested in the development of a Paper Commodity Division in the Bureau of Foreign and Domestic Commerce. The development of this division and the selection of a man as chief was a slow, difficult problem, but it has finally worked out in a very satisfactory way. To support and assist in the work of the Paper Commodity Division, a very representative committee on co-operation with the Department of Commerce has been appointed. The membership of this committee is not confined to members of this association as it was Mr. Hoover's wish that the committee represent the entire industry. This committee met with Mr. Hoover, Dr. Klein, Chief of the Bureau of Foreign and Domestic Commerce, and with Mr. Jones, Chief of the Paper Division, early in the year. Mr. Norman W. Wilson, a member of the committee, will report at this meeting upon the activities of the committee.

Information Service

At the time of the first fall conference in Chicago a suggestive plan for special educational work by the association was presented, through the president. This plan outlined an Informational Service, to be carried on in the association for the purpose of securing informative material as to the industry, to distribute this material to members of the association and to the public, where such distribution would appear to help the industry. The plan was accepted and upon its presentation to members of the association a special fund of approximately $7,500 was raised for the carrying on of the first year's work. W. B. Bullock, a trained newspaper man, was placed in charge of the service, and a year of the activities of this service have proven the value of this educational or publicity service for the industry. The activities of the association, and of the industry as a whole, have been taken to the public through magazine articles, and through the daily press. A motion picture film and lantern slide service has been developed and the demands for films and slides are simply beyond all possibility of satisfaction. It is difficult to measure the value of a piece of work of this kind in dollars and cents,—just as it is difficult to say definitely what the value of educational activities generally are. Those who have followed the work of this service carefully are enthusiastic as to the possibilities of such work for the future.

VI. Woodlands Section

The Woodlands Section was organized in 1920 for the purpose of bringing together the companies and the men in these companies having to do with the handling of forest property. This section has an individual membership of wood managers, purchasing agents, and foresters, of about 70. Several meetings have been held where programs of very real interest to the industry have been presented. The general program which is in your hands will indicate the vital character of the discussions which have taken place at the meeting of this section on Tuesday of this week.

For the first time in its long life the association, through this section, is making a serious effort to procure accurate statistics as to the wood situation as affecting the paper industry. Wood is the raw material of a very large part of the industry and it is very important that we should have information, and more, accurate statistics, as to the available supplies of wood; how much is being cut from year to year; how much wood is in the yard. We should know the wood situation in Canada and other countries from which we secure considerable quantities of pulp. O. M. Porter, the assistant secretary of the association, has had the entire development of this section in his hands and he has done an excellent piece of work.

It is along these lines that the Woodlands Section can probably be of most direct service to the members, of the association, since its objects are specifically:

1. To increase the efficiency of the wood operations of the pulp and paper industry.
2. To encourage the practice of forestry on timberland holdings.
3. To provide a medium for the gathering and dissemination of information which will promote the permanency of wood operations of the pulp and paper industry.

It is surprising at times to have a paper manufacturer ask why he should be interested in the forests of this country and Canada, and in the practice of forestry. When in such paper manufacturing centers as Holyoke or Kalamazoo, several hundred tons of pulp are being used daily to produce three or four, or five hundred tons of paper, it is difficult to understand why there should not be an increasing interest in the entire industry in the question of a permanent supply of wood for the industry. The price of wood and pulp will continue to increase with the passing years, and largely because no attention is being paid to maintaining the permanency of the forests from which this wood and pulp are coming.

VIII. Meetings and Publications

In describing the activities of a federated association, such as the American Paper and Pulp Association, it means but little to report that we have had so many meetings and that we have gotten out so many publications. Numbers of meetings held and publications put out by an association may or may not mean a great deal in the work of that association or in its service to an industry. Where meetings or publications are needed the association is trying to respond to the need and to arrange for meetings in an effective way, and to put out publications of timely interest and help.

The fall business conference in Chicago has become a fixed occasion in the activities of the association. The bringing together of all elements of the industry in a fall conference in Chicago, and especially such discussion of conditions in the industry as took place last fall are making for a better understanding of the times and a better appreciation of the desirability of all elements

of the industry working together for the common good of all. The fourth fall business conference will be held in Chicago on October 19, 1922.

The monthly bulletin of the association has been continued since it was started in June, 1920. It is not read by all the members of the association, any more than that any of us read all of the daily papers or magazines or bank reports which comes across our desks or tables. We are making a strenuous effort to take out through the Bulletin, each the work of the association, to our members and we are hoping that gradually we may make the bulletin tell more effectively the story of conditions in the paper industry and that in a way that it will cause the statement to be quoted in letters from the reserve and other banks of the country. That is, we want to make the bulletin of assistance to paper manufacturers directly and indirectly. There have been special publications put out by the association from time to time through the year on the coal situation, in tariff matters, and along other lines.

IX. Co-operation with Departments of the Government

Through the years it seems to have become almost a sport of the business men of this country to criticise the Federal and State Governments for what they do and for what they do not do. All too often there is good reason for criticism, though when the Government does actually attempt to give effective service there has not been commendation of its service but rather a grudging acceptance of it. The tendencies in the development of Government in this country in the past sixty years has been toward stronger municipal and Federal Government and weaker County and State Governments. The Federal Government will continue with passing years to take greater cognizance of economic and business conditions, and there is every reason for more effective co-operation on the part of the business man with the Federal Government and mighty little arguments against such co-operation. When the Federal Government, through tariff and tax laws, can pretty nearly control the success of business it would appear that manufacturers and business men generally must come together to work actively with all departments of the Government at Washington.

The association during the past year has made very definite effort to bring the paper industry into the right kind of contact with committees drafting legislation, and with the departments carrying out laws already in existence. The committees referred to above on co-operation with the Bureau of Standards of the Department of Commerce, and on co-operation directly with the Department of Commerce, in support of the Paper Commodity Division, have made a beginning in taking to the departments in Washington the problems and the needs of the industry.

It is farthest from the thought of your Secretary, or of these committees, to be running to Washington with every little problem that comes up in the industry or to indicate that any association in the industry is on the defensive in any way. On the contrary, the dignified and effective way in which the Tariff Committee presented the needs of the industry to the Ways and Means Committee of the House and the Senate Finance Committee has made for a much better understanding on the part of those committees of the paper industry, and has placed the association and the industry itself, on a much better plane in the minds of those having to do with legislation at Washington.

Much too oftener in the past this association has been very active in the preparation of certain legislation and then in a surprising way has concluded that the work has been completed and have not interested themselves in the carrying out of such legislation. We have spent a good deal of time and money in the preparation of statements as to what we want in the way of tariff legislation. This would appear to be but half the job since we are paying almost no attention to the way in which the tariff laws are being applied. Great quantities of paper are being brought in to this country under improper classification, and, of course, to the detriment of the paper industry. The industry should have a man who understands thoroughly the importation of paper, who could keep close touch with the larger ports, to see that paper is brought in under right classification and to secure information as to importations. Such work cannot be done with the present force of this association.

Again, the industry spent a good deal of money, and did a very effective piece of work, through the Income Tax Questionnaire Committee of the association, but with the completion of a questionnaire the work ceased, and again it would appear that we have gone but half way in the undertaking. Just as the Cost Association of the Paper Industry is doing very effective general educational work along cost lines, so the industry should have a tax expert to do educational work in the industry along tax lines. Such a man should keep in close touch with the Income Tax Bureau at Washington to see that adverse rulings are not put out through ignorance of bureau officials as to the paper industry. This same man could visit the different paper making regions, not to assist each mill in the making out of returns, but rather to discuss in the different sections, or with the different mills, the rulings being put out by the Income Tax Bureau, explaining carefully the application of obsolescence, depreciation, and other phases of the Income Tax Law. There is no question but what the industry has lost thousands of dollars by the companies failing to take advantage of exemptions under the law, which would come from a proper understanding of obsolescence, depreciation and similar technicalities of the law.

Industry Must Protect Itself

Your secretary, in referring to the failure of the industry to carry these activities through to completion, is not seeking to build up a larger organization in the association. He feels, however, that he should point out as a matter of protection to the industry what it would appear can be done to very great advantage. Other industries are protecting themselves in the similar ways and the paper industry must protect itself, if it is to prosper, in what would appear to be a considerable period of declining prices ahead of us.

Next Year

Your secretary has just passed his second year with the association. Working as he is with a federated organization he cannot get particularly close to the manufacturers who make up the affiliated associations. He appreciates most thoroughly the kindly and generous support given at all times by paper manufacturers. He is especially appreciative of the time and thought given by the president. Few members of the association appreciate how much time is demanded by the association of the president. The way in which the industry has accepted what your secretary has been trying to do the past two years has meant a great deal in his becoming established in your work. It is very reasonable for you to expect more affective work the coming year, and with your continued interest there will be more effective work.

Support Appreciated

Your secretary appreciates very keenly the spirit of friendliness and the support extended him by members of the Executive Committee of the association, the secretaries of affiliated associations, his associates in the association and the members generally. After all, the association, like any organization of men, is what the members make it. The secretary can but assist. Because he believes tremendously in the industry and in you men who make up the industry, he has confidence that he can assist. How much that assistance will mean to the association will depend entirely upon the way in which you meet not only the secretary but your president, and your Executive Committee, in the work which they are trying to do.

P. T. DODGE ON COARSE PAPER

Philip T. Dodge, president of the International Paper Company addressed the gathering on the subject of coarse paper. He stated that the primary reason for the losses now being suffered generally by news print manufacturers was due to over production. There has been an increase of 600,000 tons a year for the past several years and now production is at the tremendous figure of 2,700,000 tons annually. In 1920, which was a year of peak demand, there was an excess of 90,000 tons of paper more produced than consumed.

One of the greatest difficulties to overcome in the news print field is the tendency of manufacturers toward selfishness. This is apparent when some mills are seen to be operating at only 60 per cent of capacity at the same time others are producing over their capacity. The publishers hold a whip hand over the manufacturers and succeed in driving them against each other in large measure so that prices are forced down to a disastrously low level and losses ensue.

Among the many disturbing influences of the last very irregular year was the arrival in this country of some 230,000 tons of foreign news print which under normal conditions would not have had any great influence on the domestic market but as things were a great lack of courage was manifested in domestic circles and the comparatively small tonnage of the foreign product threw American manufacturers off their feet.

Mr. Dodge stated that he did see a rift in the clouds and that Germany would have to be assisted to her feet before much more advancement could be expected. Germany should be cured so that she can in turn minister to Russia which in its present state is a very severe detriment to the economic balance of the world.

He emphasized the point that manufacturers should not be dishonest with each other but that prices should be made openly and adhered to honesty particularly in times like the present when co-operation is vital.

News print has a hard row to hoe because it is absolutely unprotected by tariff restrictions. Gentlemen in Congress own many newspapers and between their desire to please the publishers and to secure a re-election, the paper manufacturers are sadly neglected and even trampled on. "When publishers pull the strings Congress gets up and dances," said Mr. Dodge.

"Prosperity will not come today, or tomorrow, and never will come unless we follow legitimate, logical, and legal lines of co-operation." In explaining briefly about the fight which the International Paper Company was forced to make, Mr. Dodge stated that the company had always run its mills on the American plan and were doing so at present, that while doing all possible for its employees in giving them the highest prevailing pay and the shortest prevailing hours, and assisting them in many other ways, it still ran its own company and was not dictated to by labor leaders.

PAPER SECTION COMMITTEE

A. H. Nevius, of the Miami Paper Company and Chairman of the Advisory Committee for the Paper Section of the Bureau of Standards, reported in the General Sessions of the American Paper and Pulp Association held Wednesday morning at the Waldorf, that no definite progress had been made by the committee in its meetings with representatives of the Bureau of Standards. Another meeting is, however, scheduled for some time in the near future, and Mr. Nevius expressed the hope that its results would be of a more definite character.

CO-OPERATION WITH COMMERCE DEPT.

Norman W. Wilson presented the report for the committee on co-operation with the Department of Commerce which in part was as follows:—

The Advisory Committee representing the paper industry which visited Washington, January 30 and 31, to call upon Secretary of Agriculture Wallace, to confer with Secretary Hoover and other officials of the Department of Commerce, and to meet the officials of the National Chamber of Commerce, consisted of: Philip Kimball, Liberty Paper Company, New York City; George E. Nelson, West Virginia Pulp and Paper Company; George W. Sisson, Jr., Racquette River Paper Company, Potsdam, New York; Arthur H. Nevius, Miami Paper Company, West Carrollton, Ohio; Louis T. Stevenson, Mountain Mill Paper Company, Lee, Mass.; N. W. Wilson, Hammermill Paper Company, Erie, Pa.; W. F. Brunner, Patterson Parchment Paper Company, Passaic, N. J.; Walter J. Ralbold, B. D. Rising Paper Company, Housatonic, Mass., President of the American Paper and Pulp Association and chairman of the committee, and Dr. Hugh P. Baker, Executive Secretary of the Association.

In their interview Secretary Wallace of the Department of Agriculture, assured the committee that he fully recognized the need for an intelligent and effective program to protect the present forests and to renew them as rapidly as possible. He expressed himself as strongly opposed to the proposal to remove the control of work of this nature from the Department of Agriculture and place it under the jurisdiction of the Department of the Interior.

Mr. Defrees, President of the Chamber of Commerce of the United States, Vice-president Goodwin and Acting Secretary Skinner were the next to be called upon by the committee. Mr. Defrees pointed out that the organization membership in the Chamber today numbers over 1,400 with a membership in over 800,000 corporations, firms and individuals.

At the Bureau of Foreign and Domestic Commerce the committee was received by Dr. Julius Klein, its director, who emphasized the importance of the work of Commercial Attaches, sent out by the Department of Commerce. "As opposed to the work of the American Consuls," said Dr. Klein, "The Commercial Attaches move about, thereby getting in contact with business activities."

At this point Secretary Hoover came into the conference and spoke vigorously, and to the point regarding the factors which were preventing a return to normal business. He startled the committee by stating that increased railroad rates had added $3,000,000,000 to the cost of production and distribution, and suggested that they might make a study, within the paper industry, and perhaps aim particular toward what he described as a more effective combination between the manufacturer and the merchant.

Pehaps the most significant and the most encouraging phase of the whole interview was the fact that all of the officials of the Department frankly and convincingly took the position that they were in Washington for the purpose of serving the Commerce and Industry of the United States. That they had no intention whatever of interfering with production and distribution but rather wanted to render assistance in problems of manufacturing and distribution, both in this country and abroad.

It should be a source of comfort to every business man in this country to know that we have at Washington a Department which recognizes that the backbone of the nation's welfare is the success of its industries; a Department which understands the problems of the American business man and is using intelligent methods to cope with those problems.

For the first time we now have a division of the Bureau of Foreign and Domestic Commerce dealing specifically and entirely with the problems of the paper industry and asking only that we co-operate with them and make use of them. As a part of that division you have a committee willing to work.

WHAT PAPER DIVISION CAN DO

"What the Paper Division of the Bureau of Foreign and Domestic Commerce Can Do for the Paper Industry," was the subject of the comprehensive speech of Mr. Grosvenor M. Jones, chief of that division. Mr. Jones fully explained the functions of the department in which he is interested, and urged the paper men to avail themselves of the services afforded by the establishment of the new Paper Division.

"I find a good deal of apathy among manufacturers," said Mr. Jones, "as regards the export trade." This, he concluded, undoubtedly, was due to the unsettled conditions of exchange and to the paucity of capital in many foreign countries, the necessity for the extension of long-term credits, etc. Advantages of exporting under normal conditions were pointed out, and Mr. Jones closed with his hearty assurance that his division, at least, would do everything in its power to see that there was "more business in Government and less Government in business" by co-operating whole-heartedly with the paper industry in every way possible.

REPORT OF FORESTRY COMMITTEE

The following is the report of the Forestry Committee by George W. Sisson, Jr., The Racquette River Paper Company, Potsdam, N. Y.:

The relation of forestry to the paper industry is being daily realized as more and more vital. With the great sums involved in paper manufacturing plant investments, the paper industry is willing to do more than its share toward providing a future supply of raw material.

In the last analysis the problem of the nation's paper supply is the problem of its timber supply.

The study of measures of temporary relief as well as of long-time policy for guarantee of the future has now been well started and should be continued as one of the fundamental activities of this association.

In its report to the American Paper and Pulp Association on November 14, 1919, your committee set up a program of forest conservation and utilization designed to be adequate for the purpose intended, just to the interests concerned and practicable in method of accomplishment.

This report was unanimously approved by the association as was a further report of more specific character presented at the annual meeting on April 15, 1920.

It is a matter of congratulation that the initiative and leadership of your association has met with the widespread approval by practically all interests that have given particular attention to forestry matters in the past but who had not been able up to that time to find common ground for practical and sensible co-operation.

With these two reports approved by you, with a definite legislative program in which other influential organizations are actively co-operating, and with the steady support of the officers of your association, our efforts have been constantly directed toward the enactment of the legislation, National and State, which will make possible the maintenance of our timber supply. A bill which was the best consensus of opinion of our committee of the lumber manufacturers and timberland owners and the users of forest products was introduced in the 66th Congress by Representative Snell on December 22, 1920. Brief hearings were held upon it by the Committee on Agriculture on January 26-27, 1921, but no further action taken since that Congress expired by limitation on March 4, 1921.

The bill was again introduced by Mr. Snell in the special session of the 67th Congress on April 11, 1921, and a similar bill was introduced in the Senate by Senator McCormick of Illinois on May 23, 1921. The proposed legislation will, therefore, be part of the unfinished business for the House Committee on Agriculture and the Senate Committee on Agriculture and Forestry until some action is taken or the 67th Congress terminates on March 4, 1923.

The Senate Committee has not as yet held any hearings on the proposed legislation. The House Committee, however, held very complete hearings upon the Snell bill covering all phases of it and arguments for and against on the four days, beginning January 9, 1922.

The volume of evidence presented and discussion indulged in is shown by the fact that the report of the hearing contains 260 pages in small type.

Without doubt this hearing was the most comprehensive ever held by a committee of Congress upon the question of a National Forestry Policy. It was participated in by the chief forester, by other foresters of high standing, by representatives of State forestry departments, lumber manufacturers and timberland owners and by spokesmen for the newspaper publishers and the users of forest products. Those who spoke in favor of the basic principle of Federal leadership and co-operation with the States and timberland owners in the solution of the problem were allowed three days for the presentation of their evidence and arguments. Those who wished to oppose the provisions of the bill took less than one day although more time was reserved for them had they appeared to occupy it.

The chief opponent of the bill, as at the previous hearing, was the Forest Commissioner of Pennsylvania whose arguments were of a political character and who is now a candidate for the Governorship of that State.

It is a conservative statement to say that a large majority of the foresters, the lumbermen and timberland owners and the users of forest products who are in favor of any constructive legislation whatever believe that the basic principle of the Snell bill is the best one upon which to build a practical program for an adequate and permanent timber supply.

The next move is up to the Committee on Agriculture of the House of Representatives. We have presented our plan and made our case. If the committee does nothing and the bill dies on April 4, 1923, it will be introduced in the next Congress and the fight continued. Congress unhesitatingly exceeds the budget and makes appropriations in excess of revenues where votes next November are supposed to be involved, but pleads economy and refuses to act on measures of permanent welfare whose proponents have no mercenary interest in their results.

The appropriations asked for in order to make a beginning on a broad national forestry program are insignificant in comparison with the amounts that are wasted by Congress for unworthy purposes. Even though the enactment of forestry legislation may not be secured during the present Congress, there is no reason why the Committee on Agriculture should not make a start in working out the problem through a study of the evidence presented and the rewriting of the bill in such fashion as it thinks necessary.

The greatest assistance that the members of this association can give to our efforts at this time is for every one of them individually to tell their respective members of Congress and likewise the members of the Committee on Agriculture that the pulp and paper industry is in earnest about this matter; that the problem is a serious one; that we do not intend to let up until a start has been made toward its accomplishment and that failure to act at this time will but result in new and greater demands for action the next time.

COMMITTEE ON WASTE CO-OPERATION

S. S. Rogers of the Chemical Paper Manufacturing Company, chairman presented the following report for the committee on co-operation between the American Paper and Pulp Association, National Association of Waste Material Dealers and association of American Wood Pulp Importers:

Some months ago your president asked Grellett Collins, R. S. Hatch and myself to serve as a Committee on Co-operation, to meet

at their request similar committees from the National Association of Waste Material Dealers, Inc., and the Association of American Wood Pulp Importers, to devise if possible some simple yet effective method for arbitration of differences.

It was recognized that only infrequently was there need of such a plan, but like a safety valve on a steam boiler, when it was needed it was needed very much.

The courts are of course open for such cases, but if invoked are likely to be both dilatory and expensive—dilatory because neither judge or jury are conversant with terminology and questions of fact and trade custom, and expensive because of attorney and witness fees.

We agreed that some clear and well defined plan might be devised so that to court action would be unnecessary if perchance there was a serious difference of opinion as to contract obligations.

Paper manufacturers have during the past few years come to recognize that hazy generalities too frequently lead to misunderstanding, and with this in mind have formulated through our divisions in agreement with the National Paper Trade Association clear cut trade customs which we all agree have resulted in great good to the industry.

In the same way practical customs have been formulated by other associations with whom we do business, notably the rag and waste paper classifications, all worked through in co-operation with the Waste Material Dealers' Association, and with advantage to all.

It might not be out of place to indicate briefly that in furthering an arbitration plan we are keeping step with other bodies who are seeking to promote arbitration, notably the Chamber of Commerce of the State of New York, and a few years ago the establishment by the Chicago Association of Credit Men of a tribunal for arbitration of commercial disputes. The Chamber of Commerce of the United States and the Buenos Aires Chamber of Commerce have provided an arrangement for arbitration of similar disputes. The need for such as a matter of relief to our congested court calendars is apparent and it seems almost a patriotic duty to further any procedure that will permit the courts to attend more strictly and promptly to criminal cases.

A preliminary conference at the association rooms resulted in substantial progress toward the suggested goal, and should work out a plan to submit to you (and a tentative draft has been formulated) it will be with the hope that thereby the cause of practical elementary justice will be furthered, and arbitration take the place of litigation.

REPORT OF FINANCE COMMITTEE

The report, which is the result of a series of conferences, both of the Finance Committee and of the Executive Committee of the association, in order to place the financing of the American Paper and Pulp Association upon a businesslike basis that will be fair and equitable to all classes of membership, recommends that several paragraphs be added as amendments to the articles of organization of the association.

Reduced to non-technical phraseology, the proposed amendments provide as follows:

There shall be a secretaries' committee, composed of the secretary of the American Paper and Pulp Association, and the secretaries of affiliated and service associations, of which the president of the association shall be chairman ex-officio. This committee shall meet regularly at the call of the American Paper and Pulp Association to discuss matters of general interest to the industry.

Members of affiliated associations are defacto members of the general organization. Active membership in the Service Associations (Technical, Superintendents, Salesmen's and Cost) is to be based upon active membership of the company with which the members are connected in the American Paper and Pulp Association. These service associations are brought closer to the American Paper and Pulp Association by making their secretaries, assistant secretaries of the parent association, whose secretary will have general supervision over the service associations in their contacts with it and each other.

For the fiscal year beginning April 1, 1923, the entire budget of these Service Associations shall be included with the budget of the parent association, so that all can be collected together, but the entire budget for each service association shall be turned over to the association for expenditure under the direction of its own executive committee.

All dues and assessments are to be collected through the affiliated associations, with the recommendation that the quota for the American Paper and Pulp Association be indicated to the membership of these associations.

The membership charge to mills is to consist of a flat minimum for together with an assessment based on an equitable combination of tonnage and value of product. The remainder of the report is devoted to examples of the manner in which this assessment will be worked out for the different groups of members.

The report is signed by the entire committee, consisting of Frank L. Stevens, Chairman, Stevens & Thompson Paper Company; Col. B. A. Franklin, Strathmore Paper Company; J. H. Stannard, Grand Lake Company; Frank L. Moore, Watertown, N. Y.; Freas B. Snyder, W. C. Hamilton & Sons; E. C. Betz, Consolidated Paper Company; W. J. Raybold, B. D. Rising Paper Company.

TARIFF COMMITTEE REPORT

The following report was presented by Henry W. Stokes, of the York Haven Paper Company, chairman of the Tariff Committee:

The report of your Tariff Committee presented last year covered what had been done up to February 5, at which time the briefs of the different divisions with their recommendations had been presented to the Ways and Means Committee of the House of Representatives. After several months' delay the Fordney Bill was finally prepared and passed by the House. In the opinion of most manufacturers the rates of duty contained in the bill did not afford adequate protection and were not in line with what your committee had been led to believe would be incorporated in the bill. These rates were based on the American Valuation Plan—a new departure in our tariff legislation. After giving the probable effect of the results on the basis of the American Valuation, the rates were not as high as those the industry formerly received under the Payne-Aldrich Bill of 1909. It is not necessary to go into a detailed statement of the rates provided for the various grades of paper, as these are now a matter of record and familiar to the manufacturers interested.

Opportunity to present our case before the Finance Committee of the Senate was offered on December 21, at which time your committee and other interested members appeared and filed supplementary briefs containing arguments to show why the rates provided in the Fordney Bill were inadequate. These are now before the committee for their consideration, but completed schedules have not yet been reported by that committee to the Senate. The committee believes that the Senate will increase the rates afforded in the Fordney Bill and are encouraged in this from the fact that the chairman of the sub-committee of the Ways and Means Committee having the preparation of our schedules has not objected to the changes which were asked for before the Finance Committee.

It is impossible to state when the new tariff bill will be made into law, but it is doubtful whether it will be enacted before midsummer.

The expenses of the committee have been moderate and have been borne by the different divisions of the association.

THE FEDERAL RESERVE BANK

One of the most interesting as well as entertaining speeches of the morning session was the extemporaneous talk of Mr. Case, vice-governor of the New York Federal Reserve Bank. In explaining the function of the Federal Reserve System, Mr. Case

pointed out that his bank bore the same relation to the smaller banks of the district as that between the paper mill owner and the consumer of paper.

The utility of the system was put to the test during the war, Mr. Case averred, when greater credits were extended than could be handled by the smaller banks. The Federal Reserve Banks took up this overflow, he said, and thereby acted as a safety-valve.

"I am confident that we shall never again have another currency panic such as that of 1907," he said, basing his assertion upon the liquid character of the currency handled by his bank, and the facility for sending large sums of money to any part of the country almost instantaneously.

CHAMBER OF COMMERCE AND INDUSTRY

L. M. Alexander of the Nekoosa Edwards Paper Company of Port Edwards, Wis., delivered the following address in part on the Chamber of Commerce of the United States and Industry:

"The Chamber of Commerce of the United States and Industry" is the way in which the makers of this program have chosen the subject and on which I am advised they would like to have about twenty minutes taken. I suspect that when they used the word "Industry" it had in mind, the Paper Industry.

There are at the present time but few industries that are making satisfactory progress on the road to reasonable prosperity. The panacea for such restoration is covered up by a multiplicity of views so varied that Joseph's Coat would not be recognizable, so vast are the word artists' colorings as to the prescribed shade for attaining results. In most cases such prescriptions are illusive. The good old-fashioned way of first seeking a good foundation for guidance is undoubtedly the shortest road to reach a satisfactory goal.

May we then not ask what can the Chamber of Commerce of the United States do to assist the paper industry? It seems almost like a tax on general intelligence to attempt to present any features respecting this great Organization, the character and scope of which is more or less well understood by our people. However, it will probably not be amiss in the short time allotted for this paper, for us to visualize a little on the foundation of this association. I have, therefore, caused to be enlarged an outline of the plan of organization and scope and extent of the territory covered and I trust they are of sufficient size so that they may be seen by all of those who are here present. It might be well also, at this time, to state the manner which lead to the final completion in 1921, of the present.

In April, 1912, the President of the United States and the then Secretary of Commerce, invited about 500 representatives from commercial organizations throughout the country to a meeting in the City of Washington and at that meeting the foundation for the Chamber of Commerce of the United States was laid down and plans were started which, as perfected during a period of nearly ten years, has exceeded all expectations in magnitude.

A set of by-laws was adopted in 1913, but amended in 1916 and again in 1920, greatly improving the machinery to attain objectives aimed at.

The Chamber of Commerce of the United States has set up a very large and varied lot of storehouses and in a certain sense from which it is supposed and claimed by the Chamber, they can be of great benefit to business of this country and one of their slogans is "Service."

In general, they advertise the Chamber as "National Organization of American Business Men," "The Voice of American Business," "The Spokesman of Fifteen Hundred Commercial Organizations." These are comprehensive sounding titles, but let us get down to more definite detail.

First: There is the Information Bureau.

Through this bureau they are able through a well organized and expert staff to keep information as to the merits and needs of any particular industry by having articles printed in the thousands of newspapers and fifteen hundred trade papers, reading matter from time to time which reach in the neighborhood of from five to ten million people; the value of industry such as ours before a public who have heretofore known but comparatively little about the great paper industry of the country. How would our association like to have the privileges of contributing articles for such a purpose?

Second: Then there are the representative Departments, eight in number, which have been aptly termed the Cross Sectioning of American Industry:

A. Civic Development Department. Equipped to advise how to set up any organization or association of business under the bureau plan such as: Organization service, education service, housing and city planning, immigration, citizenship, and National civics. Is there anything in this department that could be useful to our association?

How about our organization service for the American Paper & Pulp industry and is it all that it ought to be or as we should have it? Could they help us along this line?

Domestic Distribution Department. It is claimed that this has to do with taking care of the large bodies of by-products and waste materials and the economic formula for treating this subject intelligently with any industry. Do you know of any paper mill or mills in the industry? Do you know of any paper mill or mills in the industry that could get any good out of that? Poor packing, loss in transportation, bad order deliveries —anything in these suggestions worth while?

G. Natural Resources Production Department. One of the big things in connection with this department is the interest being taken in our National Forest policy. Surely the paper industry can find common ground in co-operating with this feature of the Chamber.

H. Transportation and Communication Department. This feature, especially with reference to railroad rates, will call up about the largest expression of indignation and burning shame attitude imaginable. The Chamber does not proffer any experts or anything, in fact, to help you along these lines. For one department at least, the vital feature to our association cannot be especially helpful.

It is understood, however, that there are a good many matters which, if you will take a little time to study, will furnish information that could not come amiss or be available from any other source.

I would like to conclude that in addition to what suggestions have been made above, there are many others than the representative activities that should be duly considered a while by each member of the American Paper & Pulp Association.

One of these features that is being worked hard is that of Industrial Relations. One of the officers of the Chamber stated as follows: "The subject of Industrial Relations is a delicate one. During the War, we were not recognized officially in the field of Industrial Relations. At that time such organizations as the National Association of Manufacturers and the National Industrial Conference Board were applied to regarding matters pertaining to this subject. Since the War, the picture has changed."

The pointed suggestion in regard to these two great organizations should be considered with great seriousness. Industrial Relations, like railroad rates, are liable to prove equally as important to be handled outside as to be handled inside the Chamber of Commerce of the United States. I think Co-operation, such as is recommended by the administration of all dominant political parties, is highly desirable. These associations have been recognized as in the interest of all the people as well as the Chamber of Commerce of the United States. I

hope the merits of these two other very large bodies, which are wonderfully efficient and beneficial to industry, will be considered at a later time. I think that since the cessation of war the favorable picture of them has not changed.

I hope from the above presentation of certain matters connected with the United States Chamber of Commerce that a wider and more enthusiastic view will be exhibited by the American Paper & Pulp Association and regret exceedingly that I represent its beneficial conditions so poorly.

BUSINESS AND THE PAPER MANUFACTURER

The afternoon session was called to order promptly at two o'clock, Professor Warren M. Persons being the first speaker on the program. Professor Persons is a Professor of Economics in Harvard University and has made as thoroughgoing researches into present business conditions in the United States as probably any man now living. The following is an abstract of his talk:

"There will be an increase in business activity, building construction, and the volume of manufacture this spring. In fact, this movement is already in progress. The improvement will not be merely seasonal. It will be a substantial revival continuing through 1922 and probably some part of 1923. This does not mean that a business boom is in prospect. It does mean that 1922 will be a year of easier money, better business and higher progress than was 1921, and that industry will swing upward from depression toward prosperity.

"It is highly probable that improvement in business, now as in the past, will be accompanied by rising prices. The prices of wheat, corn, livestock, and other farm products have risen considerably during the past four or five months and it is likely that future increases are in prospect. The prices of many minerals and other raw materials are still so low that they are out of line with wages, retail prices, and the wholesale prices of manufactured goods. It is probable, on the evidence of price records, that during the next year or two the prices of a considerable number of important basic commodities will show an increase of 25 to 50, or even 100 per cent above the low points of 1921. Upon the same evidence it is reasonable to expect that the general average of wholesale prices will show an increase of about 10 per cent. This does not mean that all wholesale prices are likely to increase, that liquidation is complete in every industry, or that wages and retail prices have reached rock bottom. It does mean that price maladjustment will be corrected and that during the process of correction the general trend will be upward. That is to say, in general, wholesale commodity prices will be higher six months or a year from now; the trend during the next five or ten years, however, is another question."

Professor Persons' lecture was accompanied by a series of graphs and charts which served to clarify many of the theories which he propounded. After he had concluded, ten or fifteen minutes was given over to those desiring to ask questions. The hearty approval of the assemblage was evidenced at Professor Persons' reply to the following question: "Do you believe, in view of the circumstances which you have outlined, and taking into consideration the depression which the paper industry has suffered, that if you were a paper jobber you would stock up to capacity?" Professor Persons replied instantly that he would.

TECHNICAL ASSOCIATION'S REPORT

The demand for technical education by the employees in America's paper mills has exhausted the first edition of the first of the five volumes of text books prepared for mill workers at a cost of over $40,000 to the paper manufacturers. The first volume is already being reprinted before the fourth volume of the series is published, according to the report made today by George E. Williamson of Mittineague, Mass., President of the Technical Association of the Pulp and Paper industry, at the Forty-fifth Annual Convention of the American Paper and Pulp Associaion.

Paper mills in five states are preparing to establish classes to train their employees for promotion, even before the text books which are to be used are completed, and in some of the mills preliminary instruction is already under way.

The educational work is being done in co-operation with Federal or state bureaus under the Smith-Hughes Act, and the paper manufacturers financed the preparation of the text for the books. The first two volumes were out a few months ago, the third was published last week, and the remaining two are expected during the summer, but already the first edition of the first volume is exhausted. In reviewing this work, Mr. Williamson pointed out that in addition to the $40,000 paid for preparing the text, the mills are expending many more thousands of dollars for the purchase of the books to be given to their men.

Classes are under way in four mills in three states, these mills being those of the Strathmore Paper Company at Mittineague, Mass., of the S. D. Warren Company in Maine, and of the Marathon and Nekoosa-Edwards Companies in the Wisconsin River Valley. Preliminary plans are being made for classes by the Hammermill Paper Company, at Erie, Pa.; at Appleton, Wis., lecture classes for paper mill workers are already under way.

A most important development, however, is in the Miami Valley of Ohio, where preliminary plans are under way for the establishment of classes open to the men of all the mills in that region, under supervision of a manufacturers' committee. This is the first of a series of regional classes which will undoubtedly be established in other important paper making districts when the text books are available for distribution.

COST ASSOCIATION REPORT

S. L. Bush of the Chemical Paper Manufacturing Company, president of the Cost Association, stated that the work of the Cost Association had been highly endorsed and requested to continue its work with the backing of the Association. Attention was called to the necessity of carrying out a cost accounting program adequate to present conditions. A plan of procedure for the committee to follow has already been made out, Mr. Bush said.

He emphasized the growing importance of the Cost Association and remarked that it was in every respect as important as the sales branch and deserving of an equal amount of attention.

A volume, "A Budget Cost System For Paper Mills," has been published and delivered to members free of charge and to others at the price of $10.

On June 1, 2 and 3 the Cost Association is to meet with the Superintendents at Kalamazoo, Mich. A good program has been arranged and a large attendance desired.

Mr. Bush said that the development of a sound cost accounting system was of paramount importance and an economic necessity. The Cost Association is financed by company membership only and to carry on fifty new members are needed. He stated that it would not be right for the secretary-treasurer to sell the fifty memberships, for to do so would detract from the value of his service. The Cost Association budget should be included with that of the American Paper and Pulp Association, but in view of the fact that it was deemed best not to include it in 1922 an extra effort by all members will be required to support the good work.

The third ten minute talk, by H. H. Reynoids, of the B. D. Rising Paper Company, president of the Salesmen's Association, explained the large scope of the educational work of the Association. He spoke of the books furnished to members, of meetings held, and of various other aids to the salesmen who will have a hard year to buck in 1922.

The last talk, by John H. O'Connell, president of the Superintendents' Association, gave briefly the story of the importance of the association in the paper industry. He said that labor was ever

restless and that the superintendents needed to attain a high degree of efficiency to cope with the situation. He encouraged co-operation between the Sales, Cost, and Superintendents' associations and invited all to the joint convention of the Cost and Superintendents' associations on June 1, 2 and 3 in Kalamazoo. The meeting was adjourned.

REPORT FROM SALESMEN

The third ten minute address was given by H. H. Reynolds of the B. D. Rising Paper Company, president of the Salesmen's Association. Mr. Reynolds stressed the importance of the work of the Salesmen's Association and pointed out how its efforts are accomplishing results absolutely necessary at the present time when competition is so keen that any man unequipped with a solid selling education is out of the running. Mr. Reynolds ended his short address with the expectation that more paper men would take advantage of the benefits of the association.

REPORT FROM SUPERINTENDENTS

The last of the ten minute speeches was delivered by John H. O'Connell, president of the American Pulp and Paper Mill Superintendents' Association. Mr. O'Connell stated that co-operation between the sales, cost and superintendents' associations was essential to the most effective work of the respective organizations. He told briefly how the work of the association was of especial importance at the present day in view of the fact that labor is so restless. No superintendent unequipped with technical and psychological knowledge can expect to get results in this day of chaotic conditions in industry. Mr. O'Connell terminated his talk with an invitation to all to attend the joint meeting of the Cost and Superintendents' Association at Kalamazoo, Mich., on June 1, 2 and 3.

MEETING OF THE WOODLANDS SECTION

After an introductory address Tuesday morning by D. A. Crocker of the Eastern Manufacturing Company, chairman of the Woodlands section, the secretary and treasurer of the organization, Mr. Porter, took the floor. He emphasized the importance of the work of the section and touching briefly upon "The Basic Necessity for Raw Materials," "Source of Supply," "The Handling of Raw Materials" and "The Supervision of Future Growth." He outlined three fundamental accomplishments of the Division during the past year:

1. The securing of reliable pulpwood statistics.
2. Attempted co-operation with the Canadian Association.
3. Details of costs and yields of reforestation.

Mr. Porter further stated the plans of the Woodlands Section for the coming year as follows:

1. The continuation of quarterly pulpwood reports providing the only current available statistics on the matter.
2. A development of recommendations governing the purchase and sale of pulpwood in the various pulpwood regions.
3. A development of outlines dealing with the applications of forestry methods to pulp and paper companies' logging operations.

"March pulpwood statistics," said Mr. Porter, "indicate that there has been an increase in the supply of wood. Prices have gone up slightly in New England, while the market has either been at a standstill or a gradual decrease has been evident elsewhere." Mr. Porter closed by predicting a rise in the price of pulpwood in the near future occasioned by an inevitable shortage of raw materials.

In subsequent voluntary discussions by various members of the section many suggestions were offered upon the following topics: The grading of raw materials before it reached the mill; the type of wood that Canadian producers can afford to take out of the forest; the budworm menace; the degree of decay at which a log will cease to float; the establishment of some standard of valuations that all mill men will adopt; the relative value of logs as against four-foot wood; the most efficient method of storing wood at the mill; and the transitory nature of timber estimates.

Mr. Lauderburn, in a detailed talk, outlined a plan for intensive cruising of a permanent nature. His idea of laying out 64 sample plots to the square mile—ten to an acre was heartily endorsed by the section. Mr. Wilson augmented his remarks by suggesting that a great saving could be effected through the photographing of properties by aeroplane. The feasibility of this plan received much discussion.

The next speaker was W. J. Raybold, president of the American Paper and Pulp Association. Mr. Raybold made a brief address in which he congratulated the Woodlands Section upon the development which it has attained in the year and a half of its existence. Mr. Raybold greatly amused the assemblage by his explanation of the interest he took in the wood pulp industry.

"I am a rag paper manufacturer," he announced, "but several months ago I was very much surprised to find that eighty-five per cent of our rag papers are grown in our American forests!"

Following Mr. Raybold's remarks, the first two speakers on the regular program of the section delivered their addresses. Julian Rothery, Consulting Forester, supplemented Mr. Lauderburn's theory of intensive and permanent cruising in his talk on "What can a forester do for a paper company?" The text of Mr. Rothery's address may be summed up in his affirmation: "If land is worth owning it is worth cruising."

D. A. Crocker, the chairman, then gave an interesting talk on "Company Woods Operations vs. Contracted Woods Operations," touching, as well, upon the matter of reforestation. After Mr. Crocker had finished, the section adjourned for luncheon. Starting at 2:00 p. m., the first afternoon session got smoothly under way with the exhibition of several reels of motion pictures showing logging methods in the North woods, and the use of the Holt Caterpillar Tractor in these operations. The meeting was then resumed with a request from the chairman that any suggestions for the betterment of the Woodlands section be sent to Mr. Porter, its secretary-treasurer.

Dr. Hopkins of the U. S. Bureau of Entomology then spoke on "Budworm Infestation vs. Pulpwood Production," pointing out that among all the estimated spruce, fir and leach trees in Maine and Canada, approximately twenty-five per cent of the spruce and less of the others have been killed either directly by the budworm, or through such secondary causes as root disease and budrot. "The key to future success," he averred, "is to be found in the management of growing timber and of the crop when it is ready to harvest. Slack is not as dangerous as represented," he added, "and, moreover, I have found it to serve as a protection."

Supplementing these remarks, Mr. Pearson, Entomologist of the Maine State Forestry Bureau, asserted that the egg of the budworm is propagated in the sunlight. "Consequently," he reasoned, "when the fir crop matures and stands above the surrounding hardwoods, conditions are most favorable for an epidemic of budworm." From his personal observations in the forests of Maine, Mr. Pearson is led to the conclusion that another serious outbreak of this menace will occur in about the year 1945.

Mr Ellwood Wilson of the Laurentide Company, Ltd., and P. T. Coolidge, a prominent consulting forester of Bangor, Me., followed this talk with comprehensive speeches on the subject: "Successful Reforestation for Pulp and Paper Companies." Among the practical reasons proferred by Mr. Wilson for the necessity of reforestation in smaller areas and in those which have suffered greatly through fire and insect depredations, were the following: (1) It will make possible a more modern means of transportation. (2) It will make fires more easily controlled. (3) It will decrease insect depredations. (4) It will involve the utilization of more modern mechanical devices, and (5) It will enable the forester to determine his rotations and plantations."

The meeting was again adjourned until 4:30 p. m., when several more reels of motion pictures were shown. The succeeding speeches were, necessarily, somewhat abbreviated due to lack of time. The following list includes the speakers remaining on the program together with the subjects upon which they spoke: Geo. H. Anson, Abitibi Power and Paper Company, "Labor Saving Machinery for Woods Operations"; J. O. Lynch, Lincoln Pulpwood Company, "Pulpwood Contracts, Percentages to Contractors When Wood is Peeled, Sawed, and Yarded Ready to Haul"; H. B. Morse, Orono Pulp and Paper Company, "Rossing at the Mills vs. Rossing in the Woods"; G. B. Wells, John Schroeder Lumber Company, "Advisability of Cutting Spruce Pulpwood to a Three-Inch Diameter Limit"; E. W. Kiefer, Port Huron Sulphite and Paper Company, "Pulps and Pulpwoods"; E. B. Draper, Bangor, Me., "Intensive Local Fire Protection"; E. S. Holloway and C. W. Hurtubis, Hammermill Paper Company, "Sinkage of Four and Sixteen Foot Pulpwood"; G. A. Ware, News Print Service Bureau, "A Cost System for Logging Operations."

The officers chosen by the Woodlands Section for 1922-23 were as follows: Chairman, C. W. Hurtubis, Hammermill Paper Company, Erie, Pa.; vice-chairman, Harry A. Fletcher, Fletcher Paper Company, Alpena, Mich.; secretary-treasurer, O. M. Porter, New York; executive committee: Messrs. Hurtubis, Porter, R. S. Kellogg News Print Service Bureau, Lauderborn, Pejepscott Paper Company, Brunswick, Me.; Sterling, James D. Lacey & Co.

WORK OF BUREAU OF STANDARDS

Dr. S. L. Stratton, Director of the United States Bureau of Standards, discussed on Wednesday work being done by the Bureau on problems of the paper industry, and Fred C. Curtis, Chief of the Paper Section of the Bureau, added explanatory statements as to some of the technical problems involved.

Dr. Stratton reported that within the past year there have been completed investigations on the tearing strength of paper, on the use of paper for sand bags and the identification of kraft pulp in paper, methods of determining the value of paper for blotting purposes by developing a method of testing have been worked out, and a special study of a new method of the application of electrolysis in sizing paper made.

Investigations now in progress include methods of testing thickness, effects of relative humidity on paper, further work on sizing, methods of determining the color of paper; uses of paper for wrapping furniture, and a study of the relative qualities of foreign and domestic blue print paper.

A series of machine tests are being made to determine the relative value of foreign and domestic clays for fillers.

A special study is under way also on the use of flax straw. Actual cooks have been made, and paper is actually being made commercially of this and similar materials to determine the commercial feasibility of these straws for such use. A progress report has been made on the work under way in an effort to standardize paper, as to classification, uniform sizes, and technical data, in order to avoid the economic waste due to the present infinite varieties made for the general public. This work, it was pointed out, is under way, not completed, and Dr. Stratton said that he could only make a progress report, to say that the study was under way.

SALESMAN'S ASSOCIATION

Over one hundred enthusiastic representatives of the Salesmen's Association of the Paper Industry culminated an active and interesting day's program when they assembled Tuesday night on the Waldorf Roof for their Third Annual Banquet. Congressman Dan A. Reed enlivened the latter part of the affair with a forceful talk on "The Turning of the Tide." After his speech, the evening was turned over to dancing which continued until 1:00 o'clock.

The day's program was headed with an address by the President of the Association, H. H. Reynolds of the B. D. Rising Paper Company. Mr. Reynolds congratulated the salesmen upon the strides they had attained in the face of adverse conditions and predicted a much brighter outlook for the years 1922-23.

Dr. Hugh P. Baker followed this address with his report as secretary-treasurer of the association, and surrendered the floor to Laurence H. Sloan of the Standard Statistics Service. Mr. Sloan greatly encouraged the gathering with figures which he had compiled showing the present status of the paper industry as compared with recent years in his talk: "The Salesman as an Evangel of Better Business."

T. J. Burke, C. A., secretary-treasurer of the Cost Association of the Paper Industry followed with a speech on "Cost and Selling," and after the concluding address by Herbert L. Schamberg, managing director of the National Council of Traveling Salesmen's Association, Inc., the meeting was turned over to a round table discussion of conditions in the paper industry by the members.

A recess was then called for the association buffet luncheon on the Roof Garden. The afternoon session was called to order at 2:00 o'clock. "Problems of Marketing in the Paper Industry" was the subject of the initial address of the afternoon, delivered by Prof. Harry R. Wellman, Amos Tuck School, Dartmouth College, Hanover, N. H. Professor Wellman's remarks were heartily indorsed by the chairman of the association.

H. R. Heydon, President of the National Association of Purchasing Agents had the distinction of being "speaker of the afternoon," and his clear, analytical lecture on "Does It Pay to Buy Orders?" received the well deserved applause of those assembled.

An informal reception in the parlor adjacent to the Roof Garden Dining Room occupied the hour immediately preceding the banquet. Sales representatives from every part of the country were on hand —from Texas to Northern Ontario. The banquet was heralded by the chairman as the most successful of its kind ever held by the association.

The following officers were elected:

President, H. H. Reynolds, B. D. Rising Paper Company, Housatonic, Mass.; vice-presidents for districts—New England, J. Hussey, International Paper Company, Boston, Mass.; New York, Donald MacLaurin, Liberty Paper Company, New York; Chicago, J. L. Fearing, International Paper Company, Chicago; Miami, R. T. Houk, Jr., Mead Pulp and Paper Company, Dayton.

BOOK PAPER MFRS. ASSOCIATION

The following officers were elected at the meeting of the Book Paper Mfrs. Assn., held in the East Room of the Waldorf, Tuesday, April 11: Presiden—Grellet Collins, Dill & Collins Company, Philadelphia: First Vice President—R. D. Smith, S. D. Warren Company, Boston, Mass.; Second Vice President—A. L. Pratt, Allied Paper Mills, Kalamazoo, Mich; Secretary-Treasurer—E. H. Naylor.

Members of Executive Committee—Grellet Collins, Chairman, Dill & Collins Company, Philadelphia; L. C. Anderson, The W. B. Oglesby Paper Company, Middletown, Ohio; A. H. Nevius, The Miami Paper Company, West Carrollton, Ohio; A. L. Pratt, Allied Paper Mills, Kalamazoo, Mich.; W. D. Randall, Champion Coated Paper Company, Hamilton, Ohio; G. W. Gilkey, Michigan Paper Company, Plainwell, Mich.; R. D. Smith, S. D. Warren Company, Boston, Mass.

COVER PAPER MFRS. ASSOCIATION

The Cover Paper Manufacturers' Association met at two o'clock Tuesday afternoon in the East Room of the Waldorf-Astoria. The meeting was called to order by the chairman of the association, and after a few introductory remarks in which the members were exhorted to avail themselves of the opportunities which the association offered to its various members, T. J. Burke, secretary-treasurer of the Cost Association, was introduced.

Mr. Burke stated that he believed the time would come when standard or uniform cost systems would be a recognized necessity in every industry and that the accountants in each industry would have their own association and become a highly trained body of men working with each other for the perfection of the industry's accounting system. "Accountants cannot do their work intelligently," he said, "unless they have a very thorough knowledge of all the manufacturing processes and have the benefit of the assistance that only technically educated and practical men in charge of operation can give them."

After a general discussion of trade matters in the cover paper industry, the attention of the meeting was turned to the election of officers for the year 1922-23, which were as follows: President, F. E. Taylor, Advertisers' Paper Mills, Holyoke, Mass.; vice-president, D. L. Quirk, Jr., Peninsular Paper Company, Ypsilanti, Mich.; secretary-treasurer, E. H. Naylor; Members of Executive Committee: F. E. Taylor, chairman; D. L. Quirk, Jr., and C. S. Boyd, C. S. Boyd Paper Company, Appleton, Wis.

WRITING PAPER MFRS. ASSOCIATION

The meeting of the Writing Paper Manufacturers Association was called to order promptly at 10:00 o'clock Wednesday morning in the East Room of the Waldorf. Discussion of markets was the order of the day, and various problems which have arisen since the last convention were brought up before the assembled manufacturers.

In the election of officers which followed immediately, the following men were chosen to serve for the year 1922-23:

President, N. W. Wilson, Hammermill Paper Company, Erie, Pa.; First Vice-President, H. A. Moses, Strathmore Paper Company, Mittineague, Mass.; Second Vice-President, F. A. Leahy, Eastern Manufacturing Company, New York; Secretary-Treasurer, E. H. Naylor; Members of Executive Committee; N. W. Wilson, Chairman, Hammermill Paper Company, Erie, Pa.; H. A. Moses, Strathmore Paper Company, Mittineague, Mass.; F. A. Leathy, Eastern Manufacturing Company, New York; W. M. Crane, Jr., Crane & Co., Dalton, Mass.; G. A. Galliver, American Writing Paper Company, Holyoke, Mass.; W. J. Raybold, B. D. Rising Paper Company, Housatonic, Mass.; W. C. Wing, Fox River Paper Company, Appleton, Wis.

WRAPPING PAPER MFRS. SERVICE BUREAU

The business part of the regular meeting of the Wrapping Paper Manufacturers' Service Bureau, was, in the main, occupied with a discussion of the proposed Cost Committee to co-operate with the Cost Association of the Paper Industry in revising and bringing up to date the former report issued in 1916.

Thomas J. Burke, secretary-treasurer of the Cost Association, outlined this plan in a concise ten-minute talk. "Recognizing that each branch of the industry has its own problems," said Mr. Burke, "I would like to suggest that you appoint a small standing Cost Committee to co-operate with us in working out your cost problems. I shall be glad to serve as secretary for this committee in its work," he continued, "and the Cost Association is willing to defray all expenses in connection with the publication of its report."

After Mr. Burke's talk, the meeting held at the Tea Lounge on the Waldorf roof, 10:30 Thursday morning, was given over to a general discussion of trade and manufacturing problems with which the paper men have been confronted during the past year.

GLAZED & FANCY PAPER ASSOCIATION

The Glazed and Fancy Paper Manufacturers' Association met Wednesday afternoon, April 12, in room 107 of the Waldorf-Astoria to conduct matters of routine business and elect officers. A discussion of a line of action for the year took place with the interchange of ideas and experiences.

Officers were elected as follows: President, W. H. Shuart of the Springfield Glazed Paper Company, Springfield, Mass.; vice-president, N. N. Fowler, Hampden Glazed Paper and Card Company, Holyoke, Mass.; secretary, O. M. Porter, New York; treasurer, G. Frank Merriam, Holyoke Card and Paper Company, Springfield, Mass.; executive committee: W. H. Shuart; N. N. Fowler; G. Frank Merriam; I. O. Van Duzer, Louis De Jone & Co., New York; F. O. Walther, Walther & Co., New York.

CARD BOARD MFRS. ASSOCIATION

The Card Board Manufacturers' Association met at 10 o'clock on Wednesday, April 12, in room 106 of the Waldorf-Astoria. Matters pertaining to the standardization of price and product were discussed with other matters of importance.

The following officers were elected for the ensuing year: President, G. Frank Merriam, of the Holyoke Card and Paper Company, Springfield, Mass.; vice-president, J. A. Lowe, of the Falulah Paper Company, Fitchburg, Mass.; treasurer, H. W. Suter, of the Champion Coated Paper Company, Hamilton, Ohio; secretary, O. M. Porter, New York; executive committee: G. Frank Merriam; J. A. Lowe; George A. Smith, New York-New England Company, Holyoke, Mass.

VEGETABLE PARCHMENT MFRS. ASSOCIATION

The Vegetable Parchment Manufacturers' Association convened at 2:00 o'clock Wednesday afternoon in Room 107 at the Waldorf, and attention was immediately directed to the work of the Association during the past year. After the opening address by the chairman, matters of common interest in the Vegetable Parchment industry were discussed and ideas exchanged for the solving of present and future problems.

The election of officers for the coming year was the next event of the program. William F. Brunner of the Paterson Parchment Company, Paterson, N. J., was elected president, while Mr. O. B. Towne of New York, was appointed secretary-treasurer of the association for 1922-23.

GUMMED PAPER MFRS. ASSOCIATION

The Gummed Paper Manufacturers' Association met Tuesday afternoon, April 11, in room 107 of the Waldorf. The following officers were elected for the ensuing year: President, C. H. Crowell, of Crowell Corporation, Brooklyn, N. Y.; vice-president, Phillips Kimball of the Liberty Paper Company, New York; secretary-treasurer, O. M. Porter, New York; executive committee; C. H. Crowell; Phillips Kimball; S. G. Leitch, of the Gummed Products Company, Troy, Ohio; E. C. Smith, of the Nashua Gummed and Coated Paper Company, Nashua, N. H.; O. M. Porter.

PULP MANUFACTURERS' ASSOCIATION

Manufacturers of pulp assembled in Room 106 of the Waldorf and after a brief business session, the following officers were elected for the coming year: President, Thomas W. Ross, Hummell Ross Fibre Corporation, Hopewell, Va.; secretary-treasurer, H. H. Bishop, New York; executive committee: Clark Everest, Marathon Paper Company, Rothschild, Wis.; E. W. Kiefer, Port Huron Sulphite Pulp and Paper Company, Port Huron, Mich.; W. H. Savery, Harpers Ferry Paper Company, Harpers Ferry, W. Va.

BINDERS' BOARD MFRS. ASSOCIATION

The Binders Board Manufacturers' Association held a luncheon meeting Wednesday noon in the White and Gold Room of the Waldorf-Astoria. Officers were elected as follows: President, Eugene C. Betz, Consolidated Paper Company, Monroe, Mich.; vice-president, Leigh Davey, W. L. Davey & Son, Jersey City, N. J.; secretary, A. B. Goodrich, Riverside Paper Manufacturing Company, Glastonbury, Conn.

GLASSINE MFRS. ASSOCIATION

At its annual meeting, at ten o'clock Tuesday morning, in Room 110 of the Waldorf-Astoria, the Glassine and Greaseproof Manufacturers' Association elected officers for the coming year.

L. T. Stevenson, Mountain Mill Paper Company, Lee, Mass., was made president; F. M. Boyer, Warren Parchment Company, Dexter, N. Y., vice-president; D. B. Towne, New York, secretary-treasurer, and Carl Becker, Westfield River Paper Company, Russell, Mass., was appointed executive committee of one.

WAXED PAPER MFRS. ASSOCIATION

The Association of Waxed Paper Manufacturers met in closed session at ten o'clock Wednesday morning, Waldorf-Astoria. C. A. Burskirk was chosen president for the year 1922-23. Mr. Burskirk is of the Wolverine Paper Company, Otsego, Mich. For vice-president, J. W. Hurlbut, Bennington Waxed Paper Company, Bennington, Vt., was elected.

WALKOUTS IN FOX RIVER VALLEY

Reductions in wages in several Fox river valley paper mills effective April 1, resulted in a number of employees in at least five of the mills leaving their employment as a protest against the cut. Some of the men left their work April 1 while others joined the walkout two or three days later.

Employees of the Neenah Paper Company were the first to return to work. A meeting was held at which the wages were discussed and the men decided to return to their employment. No announcement was made of the terms on which the men agreed to go back to work. Workers also left their work in the Gilbert Paper Company, Island Paper Company, Lakeview Paper Company at Neenah and Menasha, and the Thilmany Pulp and Paper Company at Kaukauna.

Nearly all of the men who walked out were unskilled workers. Very few of the skilled men left their posts. It is said most of the mills continued the men on their payrolls while they were idle.

The employees in the valley are not organized and there was no general strike call or agreement. Each walkout was an individual action although union labor leaders here are reported to have made an effort to have all the men leave their work. Union organizers now are working in the valley in an attempt to strengthen the unions.

Reductions in most of the mills ranged from 1 to 4 cents an hour. The scale for common labor now is 31 cents an hour in most of the mills. Some of the plants did not participate in the April 1 reduction.

It was reported as this was written that most of the men in the Neenah and Menasha mills would return to work Monday morning. It also was reported that employees of another mill had decided to walkout as a protest against the wage cut.

TO CONFER ON LABOR AGREEMENTS

Possibilities of friction between paper manufacturers and organized labor, according to reports from Watertown, N. Y., upon the expiration of existing agreements May 1, would seem to be indicated by the most recent developments. While inquiry on this point of manufacturers and labor leaders fails to bring forth any definite statement, the fact that conference calls have been issued on both sides and that the manufacturers have not agreed to meet labor leaders is viewed as possible indication of a pending break in relations.

Floyd L. Carlisle, president of the St. Regis Paper Company, third largest news print manufacturing concern in the country, who heads the committee of manufacturers, said that a call had been sent out to all manufacturers having labor agreements expiring May 1, for a conference at the New York offices of the St. Regis Paper Company April 13. At that time the labor situation will be discussed.

Asked if President J. T. Carey of the International Brotherhood of Paper Makers had sought a conference with manufacturers, Mr. Carlisle said that Mr. Carey had asked if a conference could be held in New York on April 14, and that he told Mr. Carey that he personally had no authority to schedule a conference but would place the proposition before the manufacturers and if they favored such a conference and authorized him to arrange one, he would do so.

"Do you consider it probable that the manufacturers will consent to meet the labor leader as requested?" he was asked. Mr. Carlisle declined to make any statement whatever on the subject.

A big conference of union leaders from all parts of the country has been called by President J. T. Carey for New York on April 13, the day on which the manufacturers will meet there. At that time it is assumed the general scheme of the proposed new agreement will be perfected.

There is a prevailing sentiment here that possibly the manufacturers will refuse to grant the conference. It is also believed that in event there is an exchange of propositions the manufacturers will insist upon certain radical changes in the existing agreements. No mention is made of there being a request from J. P. Burke, president of the International Brotherhood of Pulp and Sulphite Workers, for a conference with the manufacturers to adjust agreements affecting his men, who are generally regarded as unskilled labor.

"OUR UNCONSCIOUS MIND"

Psychology has always been used to some extent in the business world, but its value would be multiplied many times over if there was a more complete understanding of its mechanism and methods of application.

Frederick Pierce, who was always deeply interested in the subject of psychology, left his executive position of advertising and sales manager some six years ago and since that time has devoted his life wholeheartedly to delving into the deeper mysteries of the mind. In his last work, "Our Unconscious Mind and How to Use It," published by E. P. Dutton & Co., New York, he touches in a direct, clear, and practical way the lives of men, women, and children, their relations with each other and with their daily occupations.

With the advantage of an unusual education enjoyed by few, Mr. Pierce has been able to deal scientifically with the important relation of the conscious part of the mind with the unconscious part, heretofore very little understood. By practical application of the knowledge he reveals, there is hardly any problem of personality of character which cannot be solved.

Very few understand from whence dreams come or how the true goal of existence—happiness—may be found. He removes the obscurity surrounding these matters and many others in a successful endeavor to provide human kind with a better understanding of itself and of others, and also, more especially, to make the living of life an easier and more enjoyable affair.

Two chapters are devoted specifically to business. They are (1), the special application of the psychological truths stated in the first pages to business problems, and (2), new principles in advertising and selling. The higher art of salesmanship could not be better emphasized than at a time of unprecedented competition such as exists today.

The knowledge of the mechanism of the mental machinery through which selling and advertising efforts can be secured is essential and altogether too little understood. The "big salesman" of the near future must understand how the unconscious minds of others respond to, or react against, a new proposition put up to them squarely.

PAPER MERCHANTS IN CONVENTION

National Paper Trade Association of the United States Holds Annual Meeting at the Waldorf-Astoria Hotel, New York.

C. N. Bicknell, of the Union Paper & Twine Co., Cleveland, Ohio, Is Chosen President of the Association—Numerous Important Matters Are Discussed at Length at the Various Meetings of the Association—Representative Members of the Trade Speak on Interesting Topics—All the Meetings Are Unusually Well Attended—New Officers Make Speeches—Resolutions Adopted.

The Wrapping Paper Division of the National Paper Trade Association was called to order at 2:00 o'clock Tuesday, April 11, 1922, in the Astor Gallery of the Waldorf-Astoria Hotel, New York, by Vice-President Frank W. Power.

Chairman's Opening Remarks

The Chairman: It is certainly a pleasure and a privilege to meet with you again for the purpose of exchanging ideas on the subject in which we are most interested, and I hope you will all carry home something from this meeting that will be of benefit to you in the transaction of your business affairs.

As to the business conditions, there is nothing I can tell you that you do not already know. From conversations had with our members representing all parts of the country, I have learned that conditions in one location reflected the conditions elsewhere.

A great deal of time and thought has been given by the Association to the subject of Cost Accounting, so today it is safe to assume all members have a thorough knowledge as to their cost of doing business. In connection with this, let me urge that the same thought and careful consideration be given to that other most vital problem: the merchandising of our products.

The matter of merchandising I fully believe requires today the greatest consideration of any branch of our business. (Applause.)

Report of Secretary Higgins

The first business, I believe, is the report of the Secretary.

Charters K. Higgins: I want to make an informal survey of the activities that have been going on from our office in Chicago. Frequently I have heard the criticism that our members did not know all that we were trying to do, and I am very anxious to tell you some of the things which we believe to be constructive and of assistance to each member of the National Paper Trade Association.

In the first place, we are trying to build up a number of conference committees, to meet with the manufacturers who handle the various grades of wrapping paper. Many of you know that we had a very successful dinner in Chicago last November, at which were about 15 manufacturer and an equal number of our merchants. We have arranged for a similar dinner, which will be held tonight in this hotel. There will be about 26 present. We believe that in these conferences much can be done in an informal manner which you could not do in an open meeting such as this. We have met this morning with the Greaseproof and Glassine manufacturers. We had a preliminary meeting a month ago. At that time we drew up a set of Trade Customs. We then exchanged ideas through the mails and made one or two suggestions, and today we adopted a set of Trade Customs which was acceptable to both the manufacturers and ourselves.

C. N. Bicknell, President

As you know, I receive many complaints in my office concerning difficulties which some of our members have had with the mills.

Each year you hear me speak about our Collection Service, and I am going to be very brief in this particular case, but I do want to mention the fact that we have collected since last April $39,349.99. That is divided between the following associations: The Middle States, Philadelphia, Empire State, Wisconsin, Northwestern, New England, Southeastern. I have here a list of the individual members who have sent in accounts, and out of all our membership there are only 22 who are using this service. Now this service costs you nothing. If we collect an account we do not charge you a percentage for doing so. In many cases we have collected 100 per cent of the accounts that have been sent to us.

It does not make any difference where the debtor is located, as it is our stationery which pulls the account, because they don't want to get reported to the members of the National Paper Trade Association as being behind with their payments. The great trouble we have is that the majority of credit men seem to feel it is a reflection on them if they have to send the account to us, and they think if they cannot collect it no one can. This is not the case. The only accounts we get are those which you have failed to collect, and we collect over 50 per cent of them. I would like to read the amounts collected for some of the members who sent in their accounts. For one firm we collected $1,485.00; for another we collected $1,203.00; another $1,350.00; another $1,417.00; another $441.00; another $595.00; another $748.00.

I want to mention a new service that we have started since last Fall, that is our weekly sales letter. I have been very much cheered by the nice things that some of our members have said in this connection. A good many houses have requested me to send them from 15 to 30 copies, as the case may be, so they could send them on to their salesmen.

I sent out a Questionnaire just before I came east, and I would like to read to you the results of this Questionnaire. I will first read the question and then the consolidated replies. The whole Questionnaire is based on 82 replies.

I. Are you selling more paper than is being invoiced to you by your mills? In other words, are your stocks increasing; decreasing; or stationary?

22 said their stocks were increasing; 17 said they were decreasing; 44 said they were stationary.

II. How do you find collections?

17 said they were better; 24 said they were worse, and 42 said they were the same.

III. What sort of a general paper market do you anticipate between April 1st and July 31st?

47 said they were declining; 25 said they were firm, and 4 said they were advancing.

IV. How is the question of price cutting in your territory?

34 said they were bad; 29 said they were very bad; 15 said they were fair, and 2 said not much trouble.

V. Do you think it feasible to make an attempt to standardize wrapping papers, particularly Kraft?

40 say it is feasible, and 26 say they do not think it could be done.

Tomorrow there will come before the Western Classification Committee an application to change certain freight rates.

I have here a copy of a letter which is a protest of certain mills who make both Tissues and Towels. I do not think there is any chance of the change being granted because it would increase the cost of paper towels materially, and some say to such an extent that they could not compete successfully against cloth towels. This concludes my report.

WILLIAM C. RIDGWAY, SECRETARY

The Chairman: Gentlemen, you have heard the report of the Secretary. What is your pleasure?

On motion, the report of Assistant Secretary Higgins was accepted.

The Chairman: Gentlemen, we are honored today by having with us the President of the American Paper & Pulp Association, who has kindly consented to give us a few words. I take great pleasure in introducing to you Mr. W. J. Raybold. (Applause.)

Mr. Raybold Speaks

W. J. Raybold: Mr. President and gentlemen of the Wrapping Paper Division of the National Paper Trade Association—rather a formidable name, but I had to learn it by heart. When I first came in I referred to this Division, very inadvertently, to someone as I came through the hallway as "the Coarse Paper Division," and I was properly and promptly called down for naming it that. That reminded me of the situation we were in a few years ago, when we kept insistently referring to the paper merchant as a paper "jobber." Now I am very glad to say that we have got the name "merchant" fixed firmly in our minds, and I speak of that not in a joking way, because I believe that the change from the word jobber to the word merchant really represents a change that has taken place in the condition of the business—in the actual way business is done. The modern paper merchant is a merchant in every sense of the word, whereas some years ago he might have been properly called a jobber. Now the "Wrapping Paper Division" I think is a very much better name than the "Coarse Paper Division," and, Mr. President, I am very glad you have adopted it.

I noticed as I looked at your program as I came in that I was down for "An Address." Now the invitation came to me to "talk" for a few minutes. I like that much better. It makes a great deal of difference to the man who is going to do it whether he is going to make an address or talk for a few minutes.

I want to say a few things that are in my mind to say. First I want to bring you the greetings of the American Paper & Pulp Association. Of course, we represent the manufacturing end of the business quite completely, and while there is no official or organic connection between the National Paper Trade Association and the American Paper & Pulp Association, I think there is a really vital connection between the two. The interests of these two great branches of the paper industry are so nearly akin to each other that, whether we have any official or organic relation in our organization is not so essential as the fact that we should work together on the great problems that present themselves to the paper industry, and I am very glad tonight that that seems to be the case. Of later years we have been working very closely in harmony, and I believe that is as it ought to be. We are the manufacturers of the product that you gentlemen are the dis-

tributors of. One division is entirely useless without the other division, so that our interests are mutual. The problems that you have in your end of the business affect us very materially and very disastrously sometimes, and the problems that we have also reflect on the conditions as they exist with other associations, so that I say our union and our relations are extremely close, in spite of the fact that there is no official or organic relation between the two associations.

The Organization Movement

Now just on that point I want to say a word or two about this organization movement that has grown up in the last few years. It seems to me that it is a very important move in all industry, and particularly in the paper industry. I think our associations as they have been operating for the last few years have saved the paper industry tremendous amounts of money, and in saying that I am perfectly sure in making the statement that nothing has been done in the associations that are harmful to the public as a whole. In fact I honestly believe in my own soul that the public is being better served and is buying paper today cheaper and on a better basis than they would be buying it if it were not for our organizations. There is plenty of room to operate our organizations for the benefit of ourselves and the benefit of our industry and still keep well within the bounds of good morals and well within the bounds of the Sherman Act, if you please. And we are beginning to see that. The trade association is taking the place—and properly so, in my judgment—of the old-time pool and the old-time trusts, which of course were declared illegal, and were illegal, and a great many of their practices were, if not immoral, at any rate unmoral. Now that being the case we have had the situation clarified for our organization. We are getting the approval of the Government. In fact, the Government at Washington through Mr. Hoover, by correspondence between him and Mr. Daugherty, has cleared the situation tremendously, so that we know now the bounds within which we can work, and the field is large enough so that we can be of tremendous help to each other and still keep in the right track. I just wanted to say that word about organization work because I believe in it thoroughly, and I believe if you gentlemen are not getting 100 per cent membership, or not getting 100 per cent reports, that every individual in this branch of the business is losing something, if your association is not perfect or as nearly so as it can be made in making reports and all the other helpful things that are done.

In the Writing Paper Manufacturers' Association, with which I have the honor to be officially connected for three years, we have practically 100 per cent membership. We have 100 per cent in membership, and nearly 100 per cent reporting, not quite. But enough so that we get very complete returns and reports of the whole market trend and situation.

Just a few words about the conditions in the manufacturing end of the business. Of course, I am more intimately connected with the Writing Paper Division and know that more thoroughly, and yet the conditions with Wrapping Paper mills are not so tremendously different after all, and this is the way I see it in a broad way. The Writing Paper mills now are operating on the basis of orders received (they are not all operating on that basis) to pretty nearly 80 per cent of their normal tonnage. The Wrapping Paper mills are not doing quite so well as that, but pretty close to it. I think 65 per cent, or perhaps 70 per cent, would cover the operation of the Wrapping Paper mills.

No One Piling Up Stock

Now the point I want to make is this, that all the paper that is being maufactured now, in my judgment—and I guess it is true—is going through into consumption. I don't know anybody who is piling up paper stock, either the paper merchant or the printer or the man who buys wrapping paper for his own use. Of course, this liquidation of stock has been going on for nearly a year, so that the stocks are very low. Now you can see at once that if the mills are operating on the basis of anything above 60 or 75 per cent of normal tonnage, and it is all going through into consumption, it is not going to take very much of a stimulant when people begin to stock up a little, to put the mills on 100 per cent basis of running, and that I think is what is going to happen some time in the near future. I do not expect we are going to have any boom in the paper business, but there are so many signs all along the line that general business is improving, and the paper business in particular, that I feel that there are good times for the mills and for the merchants not very far ahead. You probably have noticed in the daily press a good many things that point to better conditions. The building trade is starting up all over the country. I met a man the other day from Buffalo, a man who is connected with a large financial institution, and he went over for me in conversation what is being done in the City of Buffalo alone in the way of building operations, and I was astonished at the tremendous amount of money that it was running into. That is going on all over the country.

I happen to be acquainted with men who are in touch with a certain indicative manufacturing industry—things that are dependent on the whole world situation, and almost all of them are running now to full capacity, showing that the building industry is beginning to come back. Now when we get the real building boom or the real building conditions that the country demands, it is going to make a tremendous demand for all kinds of manufactured articles, paper included. You could go right down the list and point out a dozen things. The steel industry is improving, and it makes me think of an illustration I heard the other night. In my judgment, the trouble in the paper world is very much as we stand and look at the ocean. The waves represent the troublous times that we are passing through, and little boats, some of them, are wrecked, and some of them are capsized because the surface of things is so upset and so rough, but you see some of the big ships whose keels reach down into the broad ocean current, and you will find they are moving on to prosperity.

Now take the steel industry as representing one of those large ships. I remember years ago when I was down in Maine sailing out through Casco Bay out on to the ocean with an old sea captain, and he commenced to haul in his sails, and I said, "What is the matter?" And he said, "Don't you see that big sloop out on that ocean? They are beginning to take a reef in their mainsail. There is a stiff breeze out there, and we shall have it in ten minutes, and I am getting ready for it." That is an illustration of the things that are indicative of the business world, and if you will look over these things and read the papers carefully you will see the big industries, the big ships are trimming their sails for business purposes, and are already beginning to get it.

I was surprised to learn that the steel business was operating on the basis of 75 per cent of their normal tonnage, which is more than 100 per cent of the normal tonnage before the war, and you follow this industry right down through and you will see this same indication . Now that, sooner or later—and my own judgment is it will be sooner—will reach the paper industry, and we shall all be much happier than we have been the last two years, which have been the most trying years in a generation. No doubt about that. But they are behind us. No use thinking about them any longer. They have taught us their lesson. I think we have profited by their lesson, and we have the future in front of us, which in my judgment is extremely bright. All we have to do is to keep up our courage, and I am sure there is not one who has lost his courage, no matter what the conditions have been through which we have passed.

Just one thing I want to speak of, and that is this. I believe thoroughly that the paper industry has been completely liquidated up to the present moment. Now when I say that I do not mean that possibly some time in the future paper may not be on a lower level of cost of manufacturing or merchandising, but I do mean to say this, that right up to the present point, so far as cost of manufacturing is concerned, I know absolutely that that has been liquidated

and we cannot hope to get our costs of manufacturing much lower than they are today for a long time to come.

About the merchandising, how much you gentlemen will liquidate it you know better than I do, but I am sure, as far as cost is concerned and generally speaking the price which the public is paying today, the industry has been thoroughly liquidated. You take that in connection with the fact that stocks are very low all over the country, that all the paper that is being made tolay is being consumed immediately, only a very small stimulant in the paper industry in the way of buyers beginning to pile up stock, will set us all in a very comfortable condition and start the mills running 100 per cent, and the merchants all very happy. That is what I am looking forward to.

Let us forget the hard times and quit talking and thinking about hard times and look forward to this return of prosperity.

That makes me think of a story that Mr. Logan told me the other day. Those of you who know him know what delightful Scotch stories he tells. He told me this story. A couple of Scotchman met in a convenient place, and one of them said to the other "Sandy, would you have a wee bit of whiskey?" Sandy said, "You ken well, I'm a Prohibitionist, but I am nay a bigot," (laughter) so he commenced to pour the whiskey out into a glass and he said, "Sandy, say when," and Sandy said, "We'll let the glass decide." (Laughter.) If we could get over this way of looking at the hard times we have been through and forget them, I think we can look forward to the future with courage and hopeful optimism, and with the confidence we have in ourselves and in each other and our associations, I think we shall find the better times with us before we realize it.

I am very glad, gentlmen, to have had this opportunity to come in and speak to you, and bring you the greetings of the American Paper & Pulp Association, and to tell you how glad we are to be working in harmony with the National Paper Trade Association. (Applause)

The Chairman: Gentlemen, you have heard the illuminating remarks of Mr. Raybold, and I would ask for a rising vote of thanks.

The Convention testified to their appreciation of Mr. Raybold's address by rising.

The Chairman: Some five or six years ago there was a paper read here by one of the members of our New England Association, Mr. Blackman, and it was well received, and a great deal of thought, I think, was given to that paper. It was on the subject of "Value of Co-operative Salesmanship." Since that time Mr Blackman has put that into operation, and after a great deal of persuasion he has consented to present the case to you today. I take great pleasure in calling on Mr. Blackman of Boston. (Applause.)

Remarks by Mr. Blackman

Arthur W. Blackman: Mr. President and gentlemen. I hope you will excuse my reading this instead of talking extemperaneously, but I have a great many figures here which it would be impossible to memorize.

The subject of the previous paper Mr. Power spoke of was "The Compensation of Salesmen." Today I want to speak on "The Value of Co-operative Salesmanship."

Some six years ago, at the request of Harvey Platt, I submitted to you a paper on the "Compensation of Salesmen," describing in considerable detail the system that we had operated under for the preceding six years. As I recall it, some four or five houses were interested enough in the project, at the time, to follow it up, and finally adopt the plan in such modified form as would best adjust itself to their respective systems.

Last fall, we were favored by visitation from the Association's systematizer, Mr. Schoenbucher, and received untold benefit from the three strenuous days and nights he spent with us, for I can assure you, as his stay was limited we barely gave him time to sleep. In course of time, he ran up against our plan of salesmen's compensation, registered surprise and approval, and as his time was drawing to a close, borrowed the original paper to digest on the train. You have, I presume, seen in a recent issue of *Paper Particulars* a republication of this, with his most able and comprehensive introduction.

Mr. Power asked that I present an additional paper on this same subject, being one particularly vital today, but I found it a difficult one to add to, after having treated it so exhaustively before. In fact, as I reread it myself, after a second six years, covering periods of as extreme prosperity and depression as we are likely to have again, I could not see where the scheme failed to meet the situation adaquately in the twelve years of its life, nor where it could be changed to advantage. I am compelled, therefore, to refer you back to the original paper as to my fixed views on that particular subject.

I cannot help in passing, however, to refer to one or two phases of its operation. Those of you who prefer to operate on a straight salary plan, will probably say to yourselves that you gained enough on *your* salesmen's compensation plan, the first year or two of the boom, to offset any loss made in that direction in 1921 and during the adjustment period. Are you guessing or do you know? And has the adjustment period ended? I will be bold enough to tell you that it has not ended for you, until you can answer the following questions in the affirmative:

> Have your salesmen's salaries been reduced to pre-war basis, or to a point where they do not exceed one half of the net profit as shown by actual figures of their sales?
>
> If so, did they accept the reduction cheerfully, and with an acknowledgment of fair treatment, and do you expect increased and more intelligent effort, on their part, during the immediate future, in an earnest effort to increase your profits?

Under *our* compensation plan the only possible answer would be *"yes,"* as it automatically handles these iron subjects with a velvet glove. Don't you think that it is better business policy to allow a prosperous year to carry its actual burden of selling costs, and not load up a later lean year with an inherited burden to add to its other troubles? Is it not common sense also, that your books should be so kept, that you may pay the income tax only on what you really *did* earn in a prosperous year, and not pay excess profit tax on an amount, a portion of which really belonged to expense and not profit, and thus carry over into a succeeding lean year, this expense incubus to deduct from a tax where there may *not be any*, as an Irishman might say. To sum it up in tax dollars, in smoothness of adjustment, in correctness of principle, the safe and profitable method would seem to be to let every stub stand on its own bottom, which means that each year and each salesman stands or falls on its or his own demonstrated net earnings.

Now to break away from a talked out subject, and yet keep within referring distance to it, let us talk of the value of co-operative salesmanship, for salesmanhsip is not vested alone in the salesman. The management, exemplified by the workings of the office machinery, can make or break the average man, whom you may elect to call a salesman. The power of an organization that functions on high, without missing, will impart confidence and impulses to an otherwise timid or dormant personality. For the next ten years or more, the *most*, if not the *only* successful business houses in our line, will be the ones who cut loose from sloppy, sleepy and outgrown methods (overlooked and permitted in prosperous times), and that most intelligently utilizes such labor-saving and luminous systems as are available, for each department, and see to it that those departments co-ordinate and co-operate. To put it tersely in slang it would sum us as follows: "To clean house, chuck the rubbish, suck in fresh air and register team work." Far be it from me, coming from the little Puritan town of Boston, way up on the northeast corner of

the map, to assume to advise you wise paper merchants or blase New York and Philadelphia, and of the great and glorious West, how to run your business. Please don't misunderstand me. I am here to draw inspiration, and I expect, as usual, to carry away much more than I bring. I realize that most of you have already developed satisfactory systems, calculated to meet your full requirements, so I am merely hoping that I may sow a seed or two, here and there, that may help someone, somewhere, sometime.

Now, I think you will admit with me, that the three classifications under which we operate for the making or the losing of money, may be termed:—Management, Sales and Speculations, and the greatest of these is management, for the others succeed or fail in proportion as management actually functions. Now management is merely a name for intelligent directions, and depends upon reliable information of what *was* and *is*, in order to plan for what *is to be*.

Here is where system enters in, and system is oftentime a woefully abused thing.

As properly defined "System, is a means of exerting force efficiently."

Nor for:—

The First Management Seed

Order a rubber stamp made, as per the following description, and have your office boy keep a supply of slips printed up ahead, and on the desk of your bookkeeper. Have it contain nine dotted lines, prefixed by the following wording:—First line—Date, Second—Sales for Day, Third—Sales for Month, Fourth—Cash on hand, Fifth—Accounts Payable Today, Sixth—Accounts Payable Tomorrow, Seventh—Accounts Payable Next Day, Eighth—Notes Payable and Ninth—Accounts Receivable. See that your bookkeeper fills this out each morning, so that you will find it on your desk when you arrive. These figures are easily procurable, by using the figures only, of those transactions actually put through, on the books the day before. After this is once started, it means only a few moments' work on the adding machine to give revised totals each day. Of course, on the items of Accounts Receivable, you will start from monthly balance, add each day's sales, and deduct the cash received, from day to day. If you are a comparison fiend, you may extend this form to show five money columns, to be filled in on the corresponding date for five years, in which case return the card to your bookkeeper each day, to be filed for use again the following year. With this daily information, you have started the morning with your eyes wide open.

Second Management Seed.

Furnish your billing clerk with a form, or letterhead size, ruled off into small squares. Have him list the salesman on left hand side and number the columns at the top to correspond with the working days of the current month. The first thing each morning, have him insert in the square opposite each salesman's name, and under that particular date, the number of actual sales put through the books to his credit that day. Have a line for store sales also, so that the footings of the columns will show the total sales entered each day and month, of your whole establishment. These are good for monthly and yearly comparisons, and by dividing the monthly sales, in dollars and cents, by the number of charges shown on this form, it will show you to what extent your average sale is diminishing or increasing. Have this sheet put on your desk each morning, too, for perusal, and as the salesmen know that you see this record daily, personal pride will often force an otherwise easy going salesman to get into the hustle class, and keep his average up. Of course, this is principally of psychological value, yet it has its comparative value, as relating to each man. It may be possible that three sales, of a good salesman, will often amount in value to twenty of another, so that mere numbers alone will not show the comparative work of one salesman to another, but it will show you when each man slips from his average, whatever that may be, and then is the time for a little friendly chat with him, to help him over that period of discouragement, or to talk to him like a Dutch uncle, as the case may be.

Third Management Seed

Index all sources of supply by giving each mill or purchasing account a number, prefixed by the word "Mill." Use this designation in place of real names, for all files and office reference, and keep this mill correspondence and the invoices, in a separate confidential file, open only to those entitled to refer to it. There are a dozen reasons why you should do this, as time will bring out, and there are *no* reasons why you should *not* do it.

Fourth Management Seed

Give each salesman in your employ a letter of the alphabet, as representing him and his work. Keep "A" or some other letter of the alphabet, as representing store accounts, and give a letter also to each officer, or firm member, who does any selling whatsoever. When the letters give out, use double letters, as AA or BB, or use the alphabet over again by perfixing the letter "X" like "XA," "XB," etc. By keeping track of the sales and profits of officers and firm members, the same as of all regular salesmen it will aid in determining what proportion of their salary to charge to sales, and what to overhead, as an executive. This is important in determining your percentage of overhead cost of doing business. Give each customer a permanent number prefixed by the salesmen's letter, as A-21, K-107, XS-1092, etc., and file correspondence, sales memorandums, etc., in sections or units under letter and then number, and give each salesman access to his particular file section only. The main reasons for these letters and numbers will appear later, but there is every advantage in the way of secrecy and in saving of time, not only in a conversational way, but in the way of needless writing out of names, that will show the worth of this method.

Fifth Management Seed

Assuming that your time is worth more than that of two stenographers, have one open all mail and sort it into piles of checks, orders, inquiries, complaints, mill letters, etc., and have the other mark on a certain corner of each piece of mail, the index letter and number belonging to it, and then distribute these piles to the proper departments. In a surprisingly short time the clerks will memorize the bulk of the customers' letters and numbers, doing away with the reference to the card index, which of course shows both names and numbers.

Sixth Management Seed

Use loose-leaf cash and sales record books, and start each month with a leaf for each salesman or letter used, and insert additional pages as needed. Have these sales record pages ruled with six money columns, and enter from the original sales slip, only the following record of sale, on the page reserved for each salesman:—First— Date, second—Letter and Number of customer, third—total amount of sales and fourth—gross profit. Carry to the first two money columns only the figures of *store* sales and profit, the second two money columns only the figures relating to *Railroad Delivery* sales and profit, and to the third money columns only the figures relating to *Direct* sales and profit. It is presumed your original charge slip is ruled with a column to show the gross profit, which will have been figured out before the ticket progresses far enough to be put through the books as a closed sale. These tickets will then be filed away for future reference. The entry as above, on your sales record, will be the official figures from which you will do the posting. Post only the amount of sale, not the profit, to the ledger cards. Enter all credits for goods returned, allowances, errors, etc., in red ink, in their proper columns, as per above three classifications, post them as credits and deduct the total of the red ink figures at the end of the month from the footings of the regular ink figures. At the end of each month the footings will show the exact amount of sales and gross profits each salesman is responsible for, in each of the three classes of sales. The footing of

the gross profit column, deducted from the sales column, in each class, will show the cost value of the goods sold, and in conjunction with the amount of goods invoiced will enable you to ascertain the exact amount of stock on hand for insurance and other purposes. You should then figure the proper percentage of overhead applying to each of the three classes of sales, from either the cost or selling price, as you elect; and deduct from the gross profit footing. After deducting in memorandum the footing of that particular salesman's traveling expenses, if any, the result will automatically show you the monthly value of each salesman, as a money maker, to the house, whether he be on a straight salary, salary and bonus plan, or best of all on a profit sharing basis, as he will be, when you and he become really wise. By keeping a loose-leaf cash book in the same subdivided way, and posting to the card ledger, separated into letter units, of course, by partitions or boxes, a separate trial balance can be taken off each month for each letter, and clerical errors, if any, can thus be located with ease and comfort; and another nightmare of the bookkeeper put in the discard. This permits daily posting, without for the proving of the monthly trial balance.

If, under this system a salesman dies, or leaves the house, his full record is immediately available for the use of his successor.

These are only a few of the many management seeds that might be sown, but for the limitation of time. We will now pass on to the second classification known as "Sales."

The three requisites of a successful salesman, are a working knowledge of human nature, unlimited courage or persistence, and then an intimate knowledge of the particular business. We will assume he has the first two requisities, if not, you have made a mistake in taking him on. Our stunt, therefore, is to help him attain this intimate knowledge. We cannot impart this until we have it ourselves, and the better we are equipped the more time we save him, and ourselves, and time is money, or at least it used to be.

The First Sales Seed

For the upper left hand drawer of your desk, or the desk of your head buyer, have cut a set of ruled cards, with special tabs, such as I shall describe. Have these cut the full depth of the drawer and ruled horizontally with lines about ¼-inch apart, with the upper line double ruled. Then have these cards double ruled, vertically, into three equal parts, and have each one of these thirds ruled, vertically, to show on the left hand side of the space, three columns one-half inch wide. Have the backs of these cards ruled in the same way. Have about one quarter of these cut with tabs, about one and one-half inches in width, in four styles. In the first style, have tab start at the left hand, second style have tab start where the first left off, third style have tab start where the second left off, and fourth have tab start where the third left off. Have the balance, or remaining three-fourths, of the cards cut with small tabs about three-eighths of an inch wide, in sets of ten, lapping over as above, only commencing where the fourth style left off. We will call these the fifth style. Now, order about two hundred plain cards of the same size, one hundred blue and one hundred buff, with tabs cut as style one. These buff cards can then be reversed, so as to bring the tab on the extreme right. These colored cards are to be used as guides only. Have this full set of cards written up with headings to represent your entire stock carried. The blue markers will have the tabs appear on the left, to separate and show each class, such as kraft, manila, fiber, bags, twine, boxes, etc. Use the buff cards with the tabs on the right hand side, to divide the classes into grades, or kinds, writing on the buff tab the brand or grade, in the class. Use cards style one, two, three and four to show *sizes* of paper, and *brands* of bags, or *grades* of twine. Use style five for final subdivision, such as ream weights, bag sizes, twine numbers of plies. For instance, as an example—Starting with the blue marker at the left, marked "Kraft," next would appear buff marker at the right marked "Nibroc Kraft," then style one tab, marked 24x36—25, and next a row of style five, marked:—30-35-40-50-60-70-80-, etc., then start card style two, as 30x40—40, etc. When the cards are filled out in advance, have written in, on the double top line of each card, the full title of that item, showing size, grade and weight, so that if misplaced or spilled the cards can be readily resorted. Have one stenographer made responsible for the care of this drawer, and have her enter, each day, on the proper card, from the carbon copy of all orders sent out, the day before, the following facts:—In the first column, the number of the mill, from which the goods were purchased, in the second column the date of purchase, leave the third column for insertion of date of invoice, when the goods are actually billed in, and in the fourth space enter the *amount* ordered. Next, have her, from the invoices, that day received, enter the date in the third column of each grade, corresponding with those items, that may have been billed in. This card record, always up to date, will show you, instantly, if the item you are interested in, *has* been ordered, *when* it was ordered and from *where*, and from *what mill* you previously ordered similar goods, and what *amount* you bought each year or given period. Naturally, this record becomes more valuable after a term of years, and is invaluable as an aid to a speculative plunge, when desiring to cover three, six or twelve months probable requirements. It stands ever on guard as well, to deter the reckless buyer. Used in conjunction with the perpetual stock book, it makes ordering a cinch, and over-ordering a crime. We consider this card record drawer valuable enough to command a place in the safe at night.

My record has been in constant use for thirteen years, and I have never yet shown it to a live buyer who did not sit up and take notice, and then take notes.

Second Sales Seed

The principle of a loose-leaf and a card system of perpetual stock record is, of course, the same. We prefer the former, for the ease with which it can be checked up with actual stock, at regular intervals, and for convenience in handling around the office. In fact, we keep three such books, as our railroad warehouse is across the city from our uptown office and warehouse, and we find it desirable to keep a duplicate of the warehouse stockbook *there*. This system has automatically shown up three wholesale attempts at theft, in season for us to detect the guilty ones, and collect in full, sums of approximately $500.00, $600.00 and $1,500.00. It enables us to go to sleep without fear of injustice from fire insurance adjustment, for the record is unimpeachable, as kept. As an exposer of unprofitable lines, and by showing slow turnovers it is a wonder. As an index, as to where the force slow selling stock, by showing who bought that item in the past, it is a God-send, as each deduction made shows not only the *amount*, but the *date* of the sale and the *index number* of the purchaser. As an aid to telephone sales, it is indispensable, while as a buyer's guide alone, it pays for itself. As a record on which to base entries in the "Mark-Up and Mark-Down" book it is a wonderful time saver, and makes that book possible or at least practical. I will speak of that book later. We advocate that the deduction entry be made as soon as the sale slip is made out and approved, to prevent double selling and misunderstandings. We have adopted, after considerable experimenting, the form of ruling and entering as follows:—We use a loose-leaf page, measuring nine and one-half inches deep and twelve inches wide, divided into four columns by double lines. On the left side of these four spaces, there are ruled off three more columns, each about one-third of an inch wide, which leaves a broad column about one and one-half inches wide, after allowing space for binding. Of course, the pages are lined off horizontally as well. After classifying and heading the pages, we copy from our inventory, in the top space, in the second small column, the amount on hand, in bundles or reams or thousands of pounds, as the case may be. On making a sale, we copy the amount, taken from the sales-slip, of course, in the third small column, and opposite, in the second small column, write in the amount of balance remaining. In the broad space, we

enter the date of sale in figures only, then the customer's letter and number, and to the right of that, the register number of the sales-slip. When goods are added to stock, we enter the amount in the first small column, and again put the balance on hand, in the second column, which amount must always agree with the stock on hand.

Third Sales Seed

I think it was Edison who once said, "Rubbish is only good material out of place." Following that idea to a conclusion, there must be someone, somewhere, waiting and anxious to buy all our dead stock, jobs, broken lots, odd sizes, misprinted and damaged stock, and discontinued lines. On that assumption, we, one month, on a falling market, listed all our cats, dogs and squirrels and numbered each item, then prefixed each item with a unit number, of reams, or rolls, or bundles, to slightly exceed what we considered a normal sale of that particular article. It made rather a formidable list, when it was all put down in black and white, and we found it figured up to about $75,000.00 at going market value. We desired to dump this, without disturbing the market by cutting prices, yet we were willing to take a loss, if need be, on most of the collection. This is how we accomplished it: We selected our two most energetic and resourceful salesmen, and made them captains of teams. From the complete list of salesmen, they in turn selected a name (a flip of a coin giving first choice), until all were taken. A bulletin-board was hung in a conspicuous place in our office, ruled off with two sets of squares, to show across the top, space for each working day of that month. Under this, at the left hand side appeared a list of the members of the rival teams, each arranged in alphabetical order. On this chart was written in, each day, the total sales, in dollars, of each man, and, of course, the footings showed the comparative standing of the two teams. Under this, the second set of squares, arranged and listed as the first one, showed the numbers of units that were sold by each man and team each day, also. Regular or replacement prices were fixed to the articles on this dump sale, and every man was given a carbon copy, with a full set of rules covering the contest, which were as follows:—

Rules of the Contest

The amount of the total prize, to be determined by the gross sales, at the end of this thirty-day contest, is to be based on the following:—If total sales equal

$ 5,000.00	the	prize	will	be	$ 200.00
7,500.00	"	"	"	"	400.00
10,000.00	"	"	"	"	600.00
12,000.00	"	"	"	"	800.00
15,000.00	"	"	"	"	1,000.00
17,500.00	"	"	"	"	1,250.00
20,000.00	"	"	"	"	1,500.00
22,500.00	"	"	"	"	1,750.00
25,000.00	"	"	"	"	2,000.00
27,500.00	"	"	"	"	2,250.00
30,000.00	"	"	"	"	2,500.00
(or more)					

The prize will be divided into two sums, two-thirds going to the winning team, and one-third to the losing team. These sums will be sub-divided among the members of each team, in proportion, as *their* sales compare to the sales of their team, basing the division on the last even hundred dollars sold by each man. In this contest, the losing team is to entertain the winning team at dinner, at the Hotel Napole. It is further decreed that the team which in this contest sells the fewest number of units, shall present a box of cigars to each member of the other team, the cigars to be presented at the dinner. You will notice three columns of figures preceding the items on this sale. The first column represents the amount of that item as constituting one unit, the second column represents the minimum quantity that will be considered as applying at all, in this contest, and the third column represents the amount of stock on hand, of each, as shown by the stock book the first of the month. This sale should easily amount to $20,000.00. Every one will be a winner, and it is only a question of the amount. This calls for team work, calls for a hustle from the start, and means fun, money and glory. Go to it!

Early in the contest the teams took names unto themselves, team one adopting the title of the "Hallroom Boys," and team two "The True Blues." The term "units" soon evolved itself into the name "Nuts," and numerous side bets were indulged in, pertaining to all sorts of individual contests as well. Excitement increased to fever heat, as the month rolled on. The honors rested first on one team and then on the other, a captain would be seen with his group of men, in conference, on a Saturday afternoon, and as a committee of the whole, they would act on individual suggestions, as to possible new outlets, for this or that article. Strange as it may seem, most of those articles which at first seemed the hardest to dispose of, went off the earliest, and it only needed the rumor of a *coup* by one side, to set in motion action, that ended in a *scoop* for the other side. The contest was undecided, up to the last day, and as the telephones were then working overtime, and the watches of the two captains did not agree, it was necessary to fall back on the office clock, as the official time-keeper. An old time election day was a tame affair, compared to the closing day of this contest. A general sigh of relief went up at the end, but when the returns were all in, and the final figures were posted several days later, it was found that the total sales footed up to $65,079.61. The number of nuts sold was 546. The "Hallroom Boys" won two-thirds of the prize money, selling a little over $35,200.00 to a little over $29,800.00 by the losing team. The "True Blues," however, came in a mile ahead on the "nut" sale, showing 348 to 172, or more than two to one. We anticipated that the total sale would come to about $20,000.00, and had never dreamed of its exceeding $30,000.00, so it is needless to say we came out very favorably as far as the financial side of it was concerned. The two teams had gone the limit in the desire to win. As a consequence the prize being $2,500.00 it cost us a little less than 4% on the amount of the sales, and as the goods were all sold at a reasonable margin of profit, we cleaned house without any actual net loss to the house, and without disturbing the market.

The First Speculation Seed

Mark-Up and Mark-Down Book. Theoretically the actual invoice cost, plus the overhead percentage of the cost of doing business, makes the selling cost, but on an *advancing* market, salesmen being human, would abuse the knowledge, and the house would suffer under this form of figuring. On a declining market, the salesmen, not having wings, *could* not, or *would* not operate on a loss basis, for the mere sake of theory, and the house would *again* suffer. The salesmen should participate only in the margin of profit existing between the market purchase price (or replacement price) and the actual selling price. His services are valuable only in proportion to the volume sold of fixed priced goods, or as his judgment leads, to push the most profitable lines, if at unlimited prices. Therefore, it becomes a natural part of the business to guarantee the market to your salesmen, and incidentally to the public. The unvarnished name for this action, of course, is speculation, and as following the law of the universe, "What goes up must come down," so the market fluctuations will cause this will-o-the-wisp of paper profit, to show first gain, then loss, back and forth, up and down to dizzy heights and depths, at times. So it becomes us to take heed of this fearful roving thing, and put it in restraint, as it were, where we can watch it and keep it from getting beyond control, as it is liable to, if we are ignorantly careless. On an advancing market, the house apparently stands to win, in proportion to the courage or foresight of the

buyer, and if the foresight is in the job all the time, and knows when to stop buying, all is well, *but,* and then *again, but,* sometimes the aforesaid foresight sets cross-eyed, and then something unhappy happens. I seem to recall something of that sort happening lately. I would like to plant a good fat seed here and now, in some fertile ground, while the ground is freshly plowed. You were permitted to base your January inventory on either invoice cost or replacement value, whichever was the lower. It is assumed you smashed things somewhat from original invoice costs, and wrote down some replacement figures to your salesmen and profit clerks, as new costs,—it hardly seems likely, and so, such being the case, why not start "A Mark-Up-and-Mark-Down Book," as of inventory date, and enter an amount to the credit side equal to the lump difference. We will call this amount a nest-egg, and you may be looking for eggs sometime. Or if you were so fortunate as to have on hand a line of goods that at inventory time showed a definite increase in value, over original purchase price, it is presumed you, as allowed, took this in at original invoice figures, and issued the replacement value, as new cost, and carried to the credit side of your "Mark-Up-and-Mark-Down Book" the difference. Now, if no other changes occur, and you sell out rest assured that your gross profit will be exactly as you compute it, the difference between the amounts you *figure* as costs and your selling prices, plus the nest egg on your "Mark-Up-and-Mark-Down Book." If you purchase more goods at prevailing market prices, which are higher, or have positive knowledge of an advance in price of certain goods, even without buying more and the new replacement price is greater than the one that you were figuring as invoice cost, then you should turn to your perpetual stock book and ascertain the tonnage on hand of that commodity and mark it up to replacement value, and enter a credit item, with memorandum of same, on your "Mark-Up-and-Mark-Down Book," to equal the difference in value. This means another egg in storage. Now you must be equally honest with yourself and mark down correspondingly, when the reverse condition exists and enter, in that case, a debit them. You might *justly* call this a *bad* egg. What the net balance shown in your "Mark-Up-and-Mark-Down Book" as you would the pressure gauge on your steam boiler, for if it gets too far out of control you will blow up just as sure as would your boiler. Don't get puffed up by a generous credit balance, either, for these are only *paper* profits, held in trust until the goods are actually sold. In normal times the balance will cross from credit to debit side and back again, and I have known of one five-year period when it ended up practically even. The last five years were, of course, abnormal, and I fear most of the paper profits in this class were considered real and were distributed.

At inventory time the balance on the "Mark-Up-and-Mark-Down Book" will show you the gain or loss made, independently of your sales department. This will show if your sales department is being conducted on a sound basis, for independently of market-adjustment-profit-or-loss, your sales department should earn a proper dividend each year, or be reorganized. This would seem to be only common sense, and yet I wonder how many of you know, from *actual figures,* how your profits or losses analyze as above.

Second Speculation Seed

When the end of a year shows a favorable market adjustment balance you should set aside a safe proportion of it to form a "Reserve for Depreciation" Account. You may ask why not carry a safe balance in the Profit and Loss Accounts and let it go at that? Well! On top of Federal and State Income Taxes we have a Capital Stock Tax, and the tax is levied on capital account plus credit balance of Profit and Loss Account. Accounts properly carried to the credit of "Reserve for Taxes Account" and "Reserve for Depreciation Account" are exempt from this capital stock tax, at least that is the ruling of the Boston office. Again if surplus account, or Profit and Loss account balance, is once shown and is later wiped out, or materially reduced, it is very apt to affect one's credit with the banks and mercantile agencies. I will tell you how it worked with us. In addition to our declaring certain very satisfactory dividends and making a generous addition to our surplus account each year, we built up a healthy "Reserve for Depreciation" account, and while the government considered it proper to collect a tax on same, calling it profit earned, *we* never considered it anything but a mattress to fall on, when the bottom should drop out, as it was bound to do. I am frank to say that it received something of a wallop last year, but thanks to its helpful presence and our salesmen's compensation plan, we were still enabled to pay a satisfactory dividend, and add a very healthy amount to our surplus account for the last year as well.

You may say, what have these things to do with the value of co-operative salesmanship? They have everything to do with it. It is the obligation of the house to co-operate with the salesman by furnishing authentic informations as to what *was,* and *is,* and as nearly as possible, what is *to be.* This little group of suggestions are all vitally helpful to that end, and while I know are not new in thought may be a little different in application from those systems which you now employ. For some of these thoughts we paid good money, some were of natural development and some were dug out of the atmosphere. We have found them *all* helpful and I shall feel well paid if they have helped *you.*

Thus I have sown a few seeds. I expect some fell by the wayside, and some upon stony places, and perhaps some among thorns, but I can only hope that some fell into good ground and will bear fruit.

The Chairman: Gentlemen, you have heard the very interesting and instructive paper presented by Mr. Blackman. I will ask you to extend to him a rising vote of thanks.

The request of the Chairman was complied with by the entire audience.

At 4:55 P. M. the meeting adjourned.

MEETING OF FINE PAPER DIVISION

The meeting of the Fine Paper Division was called to order at 10:30 Wednesday morning, April 12, in the Astor Gallery of the Waldorf Astoria Hotel, New York, by Vice-President C. N. Bicknell.

The Chairman: Last year, at the time of the annual meeting, our business was at a low ebb. No one knew just how quickly a change for the better would be coming. This year we are all thankful a change for the better has come. The outlook for the future is brighter today than at any time since the war. During the past year our members have shown a loyalty to the National Association that certainly deserves commendation, and I can assure you that your loyalty and steadfast support have been very gratifying to your officers and directors.

We will have the report of the Secretary, Mr. Ridgway.

Secretary Ridgway's Report

Secretary Ridgway: In closing our report at the annual meeting a year ago we expressed the earnest hope that the printer

and the paper merchant might get together in co-operative effort for the benefit of their respective businesses which are so closely related as to be practically branches of one and the same industry. As we review the happenings of the past year and consider the present state of the relations of the paper merchant and the printer as reflected by their respective National organizations, we are forced to the conclusion that the probability of the gratification of our hope is farther away than it was a year ago. We believe, however, that this conclusion is based on a false premise in that the active and aggressive campaign waged by the United Typothetæ of America to force the adoption of the "long list" method of merchandising paper and the measures undertaken by The National Paper Trade Association strictly by way of defense, do not truly reflect the relations which have and do still exist between the individual paper merchant and printer. Except in rare instances, the relation between the individuals is based on mutual interest and a real desire to be helpful each to the other and has not been changed or influenced one iota by the activities of the associations representing the printer and merchant. So long as the relation between the individuals remains in this satisfactory condition, we are justified in believing that our hope may, at no distant date, be gratified. The right thinking paper marchant, and, we believe, the right thinking printer, deplore the present situation because of the impossibility, so long as the "long list" continues to be a bone of contention between their respective associations, of instituting any constructive co-operation and many merchants and printers are keenly appreciative of the danger to the business of both growing out of the steadily increasing amount of paper going direct to the consumer since the first of the year, in some of the markets where the "long list" campaign of the Typothetæ has been most aggressive. This tendency on the part of a few paper merchants to ignore the rights of the printer is quite easily accounted for in that some merchants have taken too seriously the pledges signed by many printers to confine their purchases as far as possible to those merchants who issue "long lists," which quite obviously is the left handed way of threatening to boycott those who do not. The Typothetæ seems to have overlooked the fact that the paper merchant is in business to make a profit in the distribution of paper and, if the printer will not buy paper from any particular merchant and thereby enable him to make a profit, that that merchant is not going to retire from business but is going to seek channels, other than the printer, through which to distribute his merchandise. The misguided individuals who are now seeking the consumers' business are proving the correctness of this statement and are doing so in the mistaken belief that there was real substance in that subtle threat of boycott and in the actual verbal threat indulged in by some over-zealous individual printers.

This tendency, however, is giving the printer and the paper merchant considerable concern for, if not speedily checked, it is apt in these highly competitive times to get entirely beyond control and become a fixed practice. Such a condition is certainly not desired by any paper merchant in the country and we would urge any of you who may be tempted to sell direct, to give careful thought to where a yielding may be leading the industry as a whole.

One of the incidents of the "long list" agitation has been to focus attention on the respective merits of mill and private brands. The problems arising therefrom are not new to the industry but during the war, when the efforts of all were principally directed toward satisfying the demand for paper, they were pushed somewhat to the background, but with the collapse of the boom at the close of 1920, they again advanced to the centre of the stage. During the year 1921, the mill mark certainly grew in favor with the paper merchant and appeared to be rapidly gaining ascendancy, when in January of this year, the Typothetæ hooked up with its "long list" campaign the slogan "We buy standard millbrands only" and issued considerable literature in support of the contention that the economic advantages were all with the mill mark. Were it not for certain statements contained in this literature, which are ridiculous to anyone familiar with the facts, we could believe that the Typothetæ was entirely honest in advocating the mill as against the private brand but these statements indicate an ulterior motive, namely, the enlistment of the support in the "long list" campaign of those in the paper industry who were strongly back of the mill mark. Our observation would lead us to the conclusion that, since the Typothetæ rushed voluntarily to the support of the mill mark, there has been a perceptible swing of the pendulum back toward the private mark.

It would appear to us that the arguments advanced in favor of the mill mark apply with equal force to many of the private marks and that the real point is being overlooked by many. Standardization of the quality of any mark, whether mill or private, must be maintained to entitle that mark to a place in the sun. The paper merchant has in the past juggled the quality of his mark and the manufacturer has done likewise with his, but both have come to the realization that complete standardization, uniformly maintained, and priced on the basis of value, was better policy than the old of maintaining a given price and making the paper to fit that price.

Today the quality of the private mark is quite as well maintained as that of the mill mark.

The economic advantage in long runs cannot be denied but to date there are many private marks which give the mills far longer runs than many of the mill marks, and those who advocate a drastic reduction in the number of marks, if they are at all logical, must select for the guillotine on the basis of the quantity being manufactured and distributed, and not on the basis of mill or private mark. We firmly believe that in the natural course of events the present number of brands will be greatly reduced but we are also of the opinion that there will always be a sufficient number of both mill and private brands to satisfy demand, whether created by national advertising or salesmanship of the individual.

The good will of any mark, either private or mill, is of greater value to the one who is vested with ownership and consequently neither mills making private marks nor merchants distributing mill marks share in the increased good will value of the mark through increased sales. Because of this condition, and of the fact that there is no assurance to either of the permanency of business relations, neither is in an entirely impregnable position. We do not believe this unsatisfactory state will long continue, but look for development of methods which will better secure the rights of both manufacturer and merchant. It is quite possible that some plan of joint ownership will be worked out which will produce the desired result.

This joint ownership might be between a manufacturer and a single merchant, but more probably between a manufacturer and a group of non-competing merchants in order to take advantage of the economies of wide distribution.

We also expect a greater refinement of present plans of distribution of mill marks which will more definitely assure to the distributor the permanency of his agency. Certainly, if the merchants now distributing mill marks are wise, they will see to it that such safeguards are established.

We view with some concern the practice which has recently increased in a number of the larger markets, of manufacturers maintaining stocks from which immediate delivery may be made. As we see it, this practice is directly opposed to the interest of the merchant and if persisted in, will result in either a rapid growth and permanent establishment of the broker, or the adoption of direct selling by the manufacturer and the latter would be our choice of the two evils. We fail to see any good reason why a paper merchant worthy of the name should close his eyes to the possibilities of future evil in this plan and give his support to it simply because of the present profit he may make from the op-

portunity afforded him of selling a complete line without inventory investment.

The business of the paper merchant is ever changing and if the industry is to prosper, the merchant must be keen to ferret out the changes which are affecting his profits and diligent in applying the remedy. The Cost Accounting Bureau has during the past six months developed a change of this character in the business of the paper merchant, which had been recognized by a number of the more analytical members, and Mr. Schoenbucher will later at this meeting present the facts more in detail. This change is in the largely increased number of orders for small quantities from stock or expressed in another way, a material decrease in the average quantity per order from stock. This tendency appears to be greater on nationally advertised lines than on others, and is probably due to the creation by the advertising of "consumer demand" on the part of the smaller buyers of printing which is reflected back through the printer by his purchases of the exact quantity necessary to fill such printing jobs already placed with him.

The net result of this change is that a considerable portion of the business of the merchant, represented by sales aggregating $7.00 and less, is being done at an actual loss, and if this trend continues, there will be an even further decrease in case sales. Any member who doubts this statement will have a rude awakening, if he will make an analysis of his own business, and the sooner every merchant makes such investigation, the sooner will a remedy be applied. The limitation of the law makes it desirable that the Association stop with the presentation to the members of the facts regarding this condition and that it leave the remedy entirely to the individual.

The Chairman: There is a good deal in that paper. It will require some serious thought and some of the points will be brought up later in the day. We will now go to the report of the Conference Committees, and we will hear from Mr. Holden on Cardboard.

Mr. Holden on Cardboard

W. H. Holden: Gentlemen, we have not a very extensive report to make this morning, but there are one or two things in going over our trade customs, that we felt should be taken care of. We recomend to the Executive Committee a change in Article VI of Trade Customs on Index Bristols, which now reads as follows:

"Special weights lighter than 25½ x 30½—100 lb. base weight, and all intermediate special weights shall carry same ream price as next heavier base weight and shall not be made in lots of less than 3 tons. For lots of 25,000 lbs. or more of one basis weight this rule will not apply."

The change that we suggest to the Executive Committee to make is to read as follows, that instead of the quantity being twelve and a half tons, it be reduced to ten thousand pounds, or five tons, which will be to the benefit of the jobber and the manufacturer as well.

Another recommendation that we make is that all mills making Bristol cardboard, or other paper in that line, shall stencil on the end of their packages, whether it is a long fold or a short fold. Heretofore the printers and lithographers have been caused considerable trouble and have had rejections on account of the fold of jobs that were printed where the stock was not appropriate for the work or where the grain did not run in the proper manner. (Applause).

The Chairman: Do you want any discussion of the recommendations that the Committee makes? It seems to the Chair as though it was all in our favor to reduce these quantities on mill orders.

Secretary Ridgway: It should be referred to the Committee to take up with the manufacturers, if it meets with the approval of this meeting.

The Chairman: Is that satisfactory to you gentlemen? (The appropriate motion was made, and, the question being put, the motion was unanimously adopted).

Report of Executive Committee

The Chairman: We will next have the report of the Executive Committee, Mr. Ridgway.

Secretary Ridgeway: The Executive Committee has two resolutions which it brings in with the recommendation they be adopted by this Division.

Your Executive Committee in session on Monday and yesterday morning, carefully went over the situation, and recommends the passage of the following resolution:

"Whereas, the National Paper Trade Association at its annual meeting in 1921 went on record as opposed to the long list method of pricing paper merchandise, and

"Whereas, the United Typothetæ of America has shown in no unmistakable terms its intentions to force the adoption of such long list method, and

"Whereas, the legality of such methods has now been seriously questioned, be it

"Resolved, by the National Paper Trade Association in annual meeting assembled, that, irrespective of the question of its legality, this Association is still opposed in principle to the long list method of pricing paper merchandise."

The Chairman: Gentlemen, you have heard the correspondence read right up to the last that we have received, and you have heard the resolution. Now, if anybody would like to have that resolution read again, so that you will get it thoroughly, Mr. Ridgway will do so. Suppose you do read the resolution once more. (The resolution was again read by Mr. Ridgway).

The Chairman: What is your pleasure, gentlemen?

Its adoption was moved.

(The motion was seconded).

After thorough discussion the motion was carried by an overwhelming majority.

Resolution on Carrying Stocks

Secretary Ridgway: The Executive Committee recommends the adoption of the following resolution:

"Whereas, there appears to be a tendency toward manufacturers carrying stock in the larger markets, and

"Whereas, by so doing the manufacturers are performing one of the functions of the legitimate paper merchant, be it

"Resolved, that it is the sense of this meeting that such practice is against the best interests of the paper merchants."

Mr. Ward: I move its adoption.

(The motion was seconded).

The Chairman: Are there any comments? Are you ready for the question, gentlemen? All those favoring the resolution will please say Aye. Contrary, No.

(The resolution was unanimously adopted).

The Chairman: Gentlemen, the next will be an address by Mr. Schoenbucher, but we have gone away over our time, and we are wondering whether this can be put over until tomorrow morning, when we will give him the required time. It is something important, and we don't want to start and not give it the time it should have, and not finish it.

The next topic is unfinished business.

Secretary Ridgway: There is no unfinished business.

The Chairman: Any new business? Anything anyone wants to bring out? If not, a motion to adjourn until after the general meeting will be in order.

(At 13:39 P. M., on motion, the meeting adjourned.)

GENERAL MEETING OF THE ASSOCIATION

The Annual Meeting of the National Paper Trade Association was called to order at 2:30 o'clock P. M. on Wednesday, April 12th, 1922, in the Astor Gallery of the Waldorf Astoria Hotel, New York, by President E. F. Herrlinger.

The Chairman: This meeting of the National Paper Trade Association is now in order. I think we will have the Treasurer's Report. Mr. A. J. Corning, Treasurer.

(Treasurer A. J. Corning then read his report, which on motion was accepted with the thanks of the Association to the Treasurer.)

Secretary Ridgway presents Matters

Secretary Ridgway: Mr. President, I would report that the Auditing Committee present the following:

"Your Committee begs to report that they have checked the Treasurer's Account and find same correct. Respectfully submitted, B. W. Wilson. F. L. McClellan."

The Chairman: The Secretary has a few matters he wants to report on.

Secretary Ridgway: The Board of Directors would recommend an amendment of the by-laws, pursuant to the suggestion made by the Wrapping Paper Division of this Association. The amendment would be in the following form:

"Whereas, the word 'coarse' is frequently used to mean an inferior quality, therefore be it

"Resolved, that Article 4, Sections 1 and 3, Article 5, Sections 1 and 3, Article 6, Section 1, Article 7, Sections 1 and 2, and Article 9, Section 3, be amended to substitute the word 'wrapping' for the word 'coarse.'"

(On motion duly seconded, the amendment was adopted.)

Secretary Ridgway: The Board of Directors also gave consideration to an endorsement of the Stephens-Kelly Bill now before Congress. This bill provides for legalizing the fixing of re-sale prices by manufacturers under certain restrictions, as provided for in that bill. We have on the last two annual meetings endorsed this bill. The American Fair Trade League, which is behind the bill, request that we reiterate our position again to enable them to still assert that this Association is back of that bill. The Board recommends the adoption of the following:

"Be it resolved that the National Paper Trade Association endorses the Stephen-Kelly Bill, so-called, now before Congress, and strongly urges its members to request of their respective representatives in Congress, the support of said bill."

(On motion, duly seconded, the resolution was unanimously adopted.)

Secretary Ridgway: Your Board also desires to report that they have passed a resolution to continue the present statistical plan, and also that Mr. Farrar, the statistician of the Association, is in Washington attending a meeting called by Secretary Hoover for the purpose of discussing and laying out plans for giving this statistical information to the public under Mr. Hoover's theory that the public is entitled to this information as well as those engaged in any industry. He will be back here tomorrow morning. The conference is being held today. If his report requires any action, the Board of Directors will be called together some time tomorrow.

The President's Report

The Chairman: Gentlemen, the next in order is the President's report. I want to say that we have a rather lengthy program this afternoon, and for that reason, and because of the further fact that you probably will be more interested in hearing from the incoming officers than from those who are retiring, I am going to make my address quite brief, and I hope you will not consider it too brief.

During the past year, our industry, like many others, has, through the process of liquidation and general readjustment, been put to some real tests—I might say acid tests—which our Secretary and Assistant Secretary and other officers, in their reports, will cover in detail this afternoon.

The Paper Merchants have had many trials during the year, and when we consider how many of us there are in this great country, and how few of us have not been able to weather the storm, we should realize that we have much to be thankful for. That the worst is over goes without saying, and only a few will refuse to agree that we are on an upward trend.

Fortunate in Paper Business

I sometimes wonder if our members really appreciate how fortunate we are to be in the paper business. We have taken all kinds of inventories, but have we ever inventoried our blessings? Is there any other large industry where the merchant is subjected to fewer unfair and unreasonable trade practices than ours? I hardly think so.

Suppose today word comes from Paris or some other distant city that next fall only a certain kind of paper will be in great demand. We will say for example, that it has to be a pink stripe. We proceed to secure confirmation of this important information, and then we promptly and properly order a large stock of exactly that kind of paper. We do this because we must supply the public demand or else lose standing in the paper business.

But, when the fall season comes around we find that the fickle public has changed its mind and does not care for that kind of paper at all, and therefore it is now up to us to sell that paper at about 25 per cent of its cost, or hold it for an indefinite time.

Fortunately, you and I, as a matter of fact, don't have to worry about sudden changes in pink stripes in our business. But—suppose we did? Would we enjoy the added risk and uncertainty?

Let's assume again that we are in the shoe business and that early in the spring the factory salesman tells us that everything next winter is going to be high shoes with pointed tips; that no oxfords will be worn, and that then and there it is necessary for us to order next winter's shoes so that we may have our stock at the right time. All well and good. We order a good stock of the high shoes and look forward to a tremendous fall trade; but for some reason or other we do not have any cold weather, and the public, instead of buying high shoes finds itself very well contented with oxford shoes, of which we have bought very few. What happens then?

We find ourselves running out of oxford shoes and we wire the factory for a stock of these and we must either sell the large stock of high shoes at a reduced price or carry them over for several years until there is a chance of their coming into style again.

Extreme Cases Cited

I have cited extreme cases, but merchants in some lines of trade are frequently subject to just such puzzling and annoying problems—problems that cannot be solved and cannot be avoided, but may only be guessed at.

What about the automobile industry? Think of the annoying customs that are in vogue in that business. Suppose a man should come into your place to buy some paper and tell you that he had some old used paper on hand on which he wanted an allowance before he could think of buying any new paper from you. Suppose that most of your customers made a practice of refusing to buy from you unless you allowed them a liberal price for about a ton of their old paper for every ton of new paper which you sold them. And suppose you knew that you had to do business along that line, because all your competitors were doing so. You would think that an annoying trade custom, wouldn't you? But it's exactly the kind of thing that happens in the auto business.

Almost every time the automobile dealer sells a new automobile

he is supposed to take an old worn out machine in exchange, and the same thing is true of the tire dealer who makes you an allowance on your old tire.

Now, of course, I can imagine I hear you saying "Well, these fellows make a large profit and can afford to do it." They do make a large gross profit, but what about their net profit? I venture the assertion that the net profit is no greater in their business than it is in ours when our business is properly conducted. And it is the net profit which counts, as we all know. The business man who does not grasp firmly the difference between gross and net profit, is due for a rude awakening some day. The man who comprehends this difference, and who yet neglects to figure his selling prices according to this knowledge, is likewise headed for trouble—he is steering his ship into dangerous shoals.

But there is yet another aspect to this question. The employer's attitude represents one aspect, and the attitude of his employees represents the other. Just as "no man liveth unto himself," so it may be said that seldom can a business live and thrive upon the narrow and self-centered plan of restricting all sound business knowledge to the officers of the company. The employee does not need to know all about his company's business. There are indeed many reasons why he should not have such knowledge. But there is every reason why the employer should see to it that his establishment is permeated by the right atmosphere. The characteristics of this atmosphere do not consist alone of alertness, sincerity and confidence. Necessary though these qualities may be, they must be supplemented by diligence, determination, and—last, but not least—a clear and deep-rooted appreciation that the entire business must be measured in terms of service; that the business is valuable only in proportion as it renders service. And how is that service to be measured, and how shall it be compensated? My answer is, that it should be compensated by the gross profits which accrue from its operation, and it should be measured by the net profits which honestly and fairly accrue therefrom. A business which does not produce net profits cannot long survive, and cannot therefore continue for long to render service.

Hence, we must impress indelibly upon the minds of our employees the differences between gross profit and net profit. This is especially true in the case of those salesmen, such as we sometimes find, who are always figuring gross profits and must sometimes be shown just what little there is left out of the efforts after the expenses of the business have been taken into consideration.

We cannot afford to keep our employees in ignorance as to the true principles of legitimate business. It might seem the part of selfishness to do so, but we all know that extreme selfishness does not usually pay. I am confident that in this case it does not pay. Why should it pay to hold back those who are in our employ and therefore to a limited extent under our control? What I am not advocating is not altruism. For want of a better name, let us call it enlightened selfishness. As a message to you, it may not—and probably is not—in any sense novel. If it appear crude, you may attribute its crudeness to my inexperience in the role of philosopher or "efficiency expert." In recent years, however, we have heard much about "morale," and despite the overwork to which that word has been subjected, we cannot utterly refuse to believe in the idea it represents.

We believe in "morale" within the entire paper trade, else our trade association would not exist. I have simply ventured to discuss that morale as applied both to the paper trade in general and to the separate individual business of each of us at the same time.

An association like ours affords one of the most important means for intelligent discussion of our line of business in general, and of methods of management in particular. I have chosen to enter upon both discussions, because they are to a great extent inter-related.

When a man has faith in his own business, and a conviction that in conducting it he is rendering a real service to the public, he is more likely to render good service than if he did not have that faith and conviction. And when he has that same faith and conviction in the industry as a whole, he will stop, look and listen before he attempts to put into practice an unreasonable policy. He would properly hesitate before beginning a policy of his own which might some day grow to be a trade custom in the entire industry. Imagine a well informed man inaugurating such a mistaken policy and then saying to his fellow merchants: "The paper business isn't conducted properly. We do things that are unheard of in other industries, but we have to do them because the other fellow does."

I will venture that the first man who conceived the idea of guaranteeing a certain mileage on an automobile tire and who agreed to allow for the old tire if it did not run a certain mileage, is today the biggest kicker about trade customs in the automobile tire business—the same trade customs that he, himself, is supposed to live up to and for which he was largely, if not wholly, responsible.

I surmise that many an undesirable trade custom has originated through some merchant's lack of confidence. Perhaps it was lack of confidence in himself, or in his merchandise; perhaps it was lack of confidence in the fairness of some competitor. In order to secure a new business from a competitor, or in order to keep old business from going to a competitor, this merchant tried some unwise expedient.

Many of these unfortunate trade customs are not only detrimental to the vendor, but they fail to be of real benefit to the consumer. In most cases they need never to have been engrafted if the proper spirit had pervaded the industry.

No trade association, no matter how powerful, can prevent the final adoption of a beneficial trade custom. But a trade custom is not beneficial unless it is fair to both vendor and vendee. An active trade association can throw its weight on the side of fairness, and thus accomplish much good, provided the members are imbued with faith in one another.

In truth, it seems to me that the attributes most needed for successful accomplishment in association work, are the three virtues so charmingly symbolized in those three sisters of beautiful character—Faith, Hope and Charity.

We must have faith, because faith teaches the principles indicated by her name. Without faith one will always doubt and doubting will suspect and suspecting will come to belief, be the suspicion well founded or not.

Without hope human life is worthless. We must have hope that our fellow merchant, though sometimes not in accord with us in detail, is equally anxious to keep our industry on the highest possible plane, and may have just reason for criticizing our acts as we seem to have for decrying his.

Charity teaches us that weakness is a characteristic of the human race and if we will just remember that when our competitor differs with us we are also differing with him, our burdens will be much lighter.

The very fact that another house does something offers no good reason why you should do it, but on the contrary in many instances a very good reason why you should not do it.

I shall always be grateful to you for the honor you have permitted me to enjoy during the past year, and especially do I desire to thank the secretary, assistant secretary and officers for the hearty support and loyal co-operation accorded me. I take this occasion also to assure you that, although I may become less active as the years roll by and room is made for younger men, my interest in this grand and useful organization will never wane. (Applause).

Next, gentlemen, is the report of the Secretary.

Secretary Ridgway's Report

(Secretary Ridgway read the following report):

The past year from an Association standpoint has been markedly successful and we believe the individual member fully recognizes the value of this Association to both him and to the merchandising

branch of the paper industry. Despite the fact that but few paper merchants closed their books for 1921 without showing red figures and that the profits of the small number of fortunate ones were not large enough to promote extravagance, the individual membership of the constituent associations composing the National has been well sustained. Their membership, excluding all duplication, totals 343 as against 355, a loss of 12 individual members during the year. From reports which reach us of the experience of other trade associations, we believe we should be proud of this record.

We hold the decided opinion, however, that in practically every locality there are a number of paper merchants who would be desirable members and we would strongly urge upon the officers of constituent associations the undertaking of membership campaigns to the end that every representative paper merchant in the country will be enrolled as a member of this Association. The trade association is of far greater value to its members in times of poor business than when a boom is on, for the poorer conditions become the greater is the tendency toward the breaking down of the ethics of fair dealing and it is only through confidence established by the work of the trade association that this tendency can be checked. It is likewise self-evident that the more truly representative any organization is of an industry, the less chance there is of unfair or even dishonest practices becoming prevalent.

During the past year, your Secretary has in the interests of the Association visited the following cities: Philadelphia (four times), Cleveland, Minneapolis, St. Paul and Chicago (twice), Washington, Baltimore, Syracuse, and Boston (twice). In practically all cases he has attended association meetings in the cities mentioned. Your Assistant Secretary has attended meetings of the Central and Middle States Associations of both of which he is Secretary and of the Wisconsin and Missouri Valley Wrapping Paper Associations.

Mr. Schoenbucher, as Director of the Bureau of Uniform Cost Accounting, will report at this meeting and therefore we will not attempt to cover in any way the activities of this Bureau. We do wish, however, to emphatically state that, from reports which reach us from all sections of the country, this Bureau which was established shortly after the last annual meeting, has proven of greater worth than any other single activity and it is our conviction that the Association is most fortunate in having so able a man in charge.

The trade association today is in the glare of the spotlight. In fact so much so that one rarely takes up a daily paper or a trade journal without finding an article on some phase of its activities. The more one reads the more confused one becomes as to what are the legitimate functions of the trade association and anyone attempting to reconcile the widely divergent views, as to the application of the recent legal decisions and the meaning of the correspondence between Secretary Hoover and Attorney General Daugherty, to the problems involved would soon realize the utter futility of his effort. We do not propose to enter upon any lengthy review of the decisions or exposition of their legal effect, but we are constrained to present a few conclusions as to the legality of the present activities of the National Paper Trade Association in order that its members may have some assurance they are not heading into trouble with the district attorney.

The trade association per se has not been condemned by any of the recent decisions and in our opinion, we can with complete confidence, start from the premises that a trade association per se is entirely within the law, and, therefore, so long as it sticks to the middle of the road it is not open to successful legal attack. Has the National Paper Trade Association strayed from the middle of the road? To answer this question we must examine its activities and apply to them the law as laid down by the courts. The National Association collects statistics of purchases, sales, receipts and shipments of paper from about fifty per cent of its fine paper members and approximately forty per cent of its members handling wrapping papers, which statistics either in total figures or in graphic chart form are distributed only to those members who contribute their individual figures. The charts covering writing, book and cover papers are also exchanged with the manufacturers of these lines for like charts showing the production, orders received, shipments and stock on hand of the manufacturers.

Some Interesting Cases

The "Linseed Oil" and the "Hardwood Lumber" cases are those in point as to this particular activity. The "Linseed Oil" decision was rendered in the United States District Court in Illinois by Judge Carpenter. The Linseed Oil Council engaged in the collection of and dissemination to its members of statistics as to production, etc., and also of past prices. In other words, it was a full fledged "open price" association. The court held that there was no proof that the members, at meetings or at other places, discussed prices or made agreements, that production was not limited, that there was no proof of division of territory, that there was no proof that the prices asked by the individual members were not fixed by them upon their own judgment and that there was no proof that any member was under the slightest restraint in the matter of pricing. In view of these findings of fact, the questions of whether the "open price plan" was inherently illegal was squarely presented and Judge Carpenter, in an opinion which would strongly appeal to the business men, held that it was not.

About the middle of December, the Supreme Court of the United States, by a divided Court six to three, handed down the "Hardwood Lumber" decision which has been the subject of so much difference of opinion as to just what was condemned by the highest judicial tribunal of our land. The American Hardwood Lumber Association was a typical "open price" association in so far as statistics of production, etc., and past prices were concerned, but it differed from the Linseed Oil Council in that it did not stop with the placing of such information in the hands of its members for their individual guidance. This difference is clearly set out in the following quotation from the opinion of the Court, rendered by Justice Clarke:

"This elaborate plan for the interchange of reports does not simply supply to each member the amount of stock held, the sales made and the prices received, by every other member of the group, thereby furnish the date for judging the market, on the basis of supply and demand, and current prices. It goes much farther. It not only furnished such information, with respect to stock, sales and prices, but also reports, giving the views of each member as to the 'market' conditions for the next few months; what the production of each will be for the next 'two months'; frequent analyses of the reports by an expert, with, we shall see, significant suggestions as to both future prices and production; and opportunities for future meetings, for the interchange of views, which the record shows were very important."

We are strongly of the opinion that the "Hardwood Lumber" case does go so far as to declare the "open price" plan to be illegal per se and we are quite positive in our belief that the statistical plan of the National Paper Trade Association, omitting as it does any exchange of past prices, is not in any way a restraint of trade and therefore, is entirely legal.

Mr. Hoover, as Secretary of Commerce, has interested himself in the work of trading associations and has put his stamp of approval on the legitimate association by the statement that the services of such should be preserved and even better organized. As a means of clarifying the situation it developed after the decision in the "Hardwood Lumber" case, Mr. Hoover addressed "an informal interdepartmental communication" to the Attorney General. We assume you are generally familiar with this communication and the reply of the Attorney General as they have been given wide publicity. This correspondence does not seem to

us definitely to settle anything and we are in complete agreement with the Secretary of the American Fair Trade League, who said it reminded him of the old couplet:

"Mother, may I go out to swim?
Yes, my darling daughter,
Hang your clothes on a hickory limb,
But don't go near the water."

However, the letter of Mr. Hoover sets out certain definite association activities and it is significant that the Attorney General did not condemn any of those enumerated as illegal per se, but did definitely state "If in the actual practice of any of them it shall develop that competition is suppressed or prices are materially enhanced, this Department must treat such a practice as it treats any other one which is violative of the Anti-trust Act."

Mr. Hoover, in his letter advanced his belief that good morals and a sense of fair dealing requires that statistical information gathered by trade associations should be given to the public generally at the same time it was made available for the members "to the end that all persons engaged will be on an even footing." For the purpose of carrying out this idea of making statistics available to all he has called a conference to obtain a list of associations willing to voluntarily furnish such statistics to the Department of Commerce and to determine upon details to carry out the idea of giving them to the public generally. This conference is being held today in Washington and is being attended by a representative of this Association with instructions to offer our fullest co-operation.

After wandering somewhat from our text, we will now return to an examination of the legality of the activities of this association. We know of no legal decision which has directly attacked the installation of uniform cost accounting system nor are we aware of any law, or legal principle, which would make this activity of itself illegal. We fully recognize, however, that this activity of itself entirely free from any taint of illegality, could be conducted in a manner which would violate all law. In other words, it is the use to which this as well as other association activities are put that determines its legality or illegality. The installation of uniform cost system, the education of the members to the necessity of an intimate, detailed knowledge of their individual costs and the presentation to the industry as a whole of any problems which may be disclosed as a result of uniform cost methods are entirely legal, provided the solution of any such problems are left exclusively to the individual. The cost accounting bureau has not gone, nor is it contemplated that it will go, beyond the scope of activity as outlined.

As an example of the illegal use of uniform cost systems, we quote from the letter of the Attorney General to Mr. Hoover, referred to above. "It is as clearly a violation of the law to agree upon the cost of an item that constitutes substantial part of the total cost price when its cost actually varies, as to agree upon the sales price, because the sales price is substantially affected by such agreement."

All other activities of the National Association such as the weekly bulletins issued from the Assistant Secretary's office, the collection bureau, also conducted by the Assistant Secretary, the standardization of sizes and weights through trade customs, etc., have not been, and are not today, questioned, but come within the admittedly legitimate functions of trade associations. We desire to reiterate that it must always be borne in mind that any activity most innocent in appearance may become illegal if, in practical operation it curtails production, materially enhances prices, unreasonably restrains trade or results in suppression of competition. The legality of any activity must be judged by the results obtained from its operation rather than from its form or from any declaration of the motive which led to its adoption.

We cannot leave this subject without here recording our protest against special legislation recently passed by Congress which relieves the farmer from the restrictions of the Sherman Law. Heretofore the Labor Unions were the only privileged class, but by adding the farmer, our lawmakers have again turned their backs on the principle of "equality before the law" on which our government is founded.

The calendar year 1921 for the paper merchant was one of the most unsatisfactory, so far as profits were concerned, of the past decade. We are of the belief that not more than one in twenty of our members showed a profit, and the profit of even those few was extremely meagre when considered in relation to sales. Of course, inventory losses were principally responsible for this result, but none were able to reduce overhead as rapidly as the gross margins decreased and many found it impossible to make even a trading profit until the closing months of the year.

The difficulty surrounding the reduction of overhead to a point in proper ratio to sales is complicated by several factors. In addition to the expense reductions already effected through increased efficiency, it may generally be said that total dollars of expense must be reduced about 20 per cent further before a satisfactory profit can be earned, assuming that the margins, tonnage and price levels remain at the level of the last few months. The difficulty in accomplishing this reduction, will be recognized when it is remembered that many of the expenses, such as rent, depreciation, telephone, postage and some forms of insurance, are more or less fixed.

A 20 per cent reduction of expense means wage adjustments of nearly 30 per cent downward, and such a wage reduction would appear to be too drastic until living costs have been reduced. To increase the foregoing difficulties, it should be borne in mind that every time price levels go off 5 per cent, it will be necessary to immediately effect an additional expense reduction of about 12 per cent to offset these changes assuming the same tonnage and margins to prevail. These statements are not steeped in theory. They can easily be proved by a test of your own figures.

It is probable that many will be tempted to surmount these difficulties by going after volume of sales and thereby create the proper ratio between overhead and sales, but such procedure will prove entirely futile for the inevitable result of a drive for volume is decreased margins, regardless of whether the increased volume is sought at present margins or below. Volume can only be attained by taking business from another merchant and when that merchant realizes he is losing business, he will assume that others are cutting prices and will be able to find enough actual instances (and there always are) to assure him that his assumption is correct and he is then actuated to violate good business sense by cutting prices in order to regain or hold his regular business. The merchant seeking volume is then forced in turn to reduced margin in order to obtain it and the net result is a general lowering of margins and the increase, even if obtained, does not overcome the present difficulties. As a rule, increased volume is profitable only when business is generally profitable.

It, therefore, follows that the solution of the difficulty lies in refining the business now being done to the end that the unprofitable items are put on a proper basis and this can be accomplished only by a thorough study of your business and, when the facts are established, the prompt application of a remedy.

Present business so far as volume is concerned, is reasonably satisfactory and, if maintained on the same basis during the balance of the year, would make it possible to avoid red figures, but the present chaotic price situation especially on the highly competitive papers, if continued, will together with the definite tendency toward a greater number of orders for smaller quantities, and the attendant additional expense, make it impossible for the merchant to realize anywhere near an adequate or proper merchandising profit and there is grave danger of red figures unless these conditions change for the better. The possibility,

even probability, of inventory losses during the year is even a graver menace to profits, for even a ten per cent loss on inventory would wipe out all possible profits, based on the present volume of business. An appreciable, sustained increase in volume would, in all probability, remove the danger of inventory losses and enable the merchant to close the year without red figures, but we are unable to reach the conclusion that business generally will for some time to come greatly improve. We do not expect a material lessening of the present demand, but we are of the belief that liquidation both in this country and abroad is not yet complete and until that condition is reached, there is firm basis for other than "fair" business. It is quite possible that because of diminished stocks, a moderate increase in the demand may create the appearance of a boom, but until a firm foundation is provided, there is no likelihood of business getting on a level higher than at present for any length of time.

There would seem to be just about as many uncertainties as to the future course of the paper market this year as in the year past, but in the merchandising branch of the paper business there is one rule which, if consistently followed, has produced good results, namely, aim to make your profit in merchandising not in speculation. It would appear to us to be particularly applicable at this time.

The Chairman: Gentlemen, I think we are very fortunate to have such an illuminating report from our secretary. What is your pleasure with reference to it?

(On motion, the report was accepted and placed on file.)

Telegram from Mr. Lyter

Secretary Ridgway: I have a telegram from Mr. Curtis E. Lyter, from Albuquerque. "I would rather be at the meeting of the National Paper Trade Association this week than any other place on earth, for I would meet there most of the friends to whom I am indebted for the privilege of remaining here, where my life is being prolonged. Please extend to the members my great thanks and best wishes for their health, happiness and prosperity. (signed) Curtis E. Lyter." (Applause.)

Mr. A. M. Miller: Mr. President, I move that the secretary send a telegram of appreciation to Mr. Lyter.

(The motion prevailed.)

The Chairman: Gentlemen, Mr. Ridgway, our secretary, explained to you, we have had some very efficient work done by the gentleman in charge of the cost accounting, Mr. Schoenbucher, and I know you will be pleased to hear from him.

Remarks by Mr. Schoenbucher

Mr. Schoenbucher: I wish to remind the members of the Fine Paper Division that immediately after this meeting there will be a continuation of the Fine Paper Division meeting of this morning. May I therefore ask every member of the Fine Paper Division to make it a point to stay after the general meeting in order to listen to some of the vital problems to be discussed. During the past ten months I have been in the cities of Boston, to some slight extent in New York City, and also to Philadelphia, Baltimore, Richmond and practically all of the cities in the middle and far west, including the Pacific Coast. I have not been to the far south and there were some few western cities which I was obliged to pass over on my last trip. It has been suggested to me by men from various parts of the country that much could be accomplished by holding meetings at the cities which I visited, in order that the problems which the paper merchant faces may be discussed in detail, and in order to gain quicker action on the application of sound cost accounting principles to your businesses.

There are several thoughts or impressions which have come to me while listening to what has been said here this afternoon. Just a thought in connection with trade associations and the attention which is being given to the activity of these bodies by both the government and the public. It is my earnest belief that the world's next greatest man will not be the proverbial man on horseback, but rather a great, sound, deep thinking philosopher, whose logic of reasoning will convince men generally that so long as men in business are legally compelled to fight one another under a vicious competitive business regime, just so long will these men be impelled, and perhaps obliged, to fight with their employees. It is my belief that right back of all the labor unrest which exists throughout this country today, tracing it back to its lair, lies the competitive conditions under which all industry operates. It is gratifying to note that many of these difficulties are reaching some stage of clarification, principally through the efforts of Secretary Hoover and a few other men now in public office.

Recently there was a Federal decision rendered which makes it absolutely illegal for a man to cut his own price. Now just think of that. This means that a man who this morning sells a customer a given quantity of goods at a certain price and this afternoon sells some other customer that same quantity of goods at a lower price is breaking the law. A few years ago such a decision would have been considered absolutely unsound and would never have been dreamed of. So you see where all of these laws which are being specifically directed against the natural economic laws of business are leading us to. The very things which have been desired to be brought about by business men to improve the ethics of business and which were formerly in a large measure stifled by law are, after all, now being shaped gradually in a satisfactory manner to the community at large. There are several other things I wish to touch upon. As an instance, consider for a moment the foolish mistakes which some men make in the conduct of their business. I visited a man not so very long ago who was violating a trade custom, which is now so universally recognized as to become what might be called one of the cardinal trade customs of the industry. I did not touch upon this fact because I felt quite certain that if I did he would feel that the other members of the Association had sent me around to see him to discuss the matter. Fortunately, however, he brought the matter up himself and justified his action by stating that he was gaining a direct benefit by so doing. We discussed the supposed benefit which he believed he was deriving from this practice and after about ten or fifteen minutes of discussion, in the course of which his results were discussed, I am of the opinion he became thoroughly convinced, even though he did not admit it, that he was not gaining any benefit whatsoever by this practice and that it was costing him a loss of about $7,500 per annum. I found no one who was at all affected in this territory by this practice except that the matter was somewhat annoying to others.

There is another subject which it has been suggested I touch upon. There seems to have been considerable complaint against the widespread practice of mailing out the job lists and unloading undesired merchandise on other markets. This has no reference to the mailing out of legitimate price lists. These lists seldom bring results to the man who issues the list, but make it exceedingly difficult for a salesman actively soliciting a country territory at considerable expense to eke out an honest living. This is particularly felt now because of the fact that there is only about one salesman in fifty traveling out his own city who is showing a profit to his house. When a man gets $250 or $300 a month and sells $5,000 worth of merchandise, generally, he is doing fairly well, but if there be added to this amount anywhere from $300 to $500 additional for traveling expenses, the total selling expense on such men runs up to 12, 15 and sometimes 20 per cent on the total sales.

I want to ask all of the men who have had sufficient confidence in me to sit down with me and go over their confidential figures. It is a surprising thing to note how very closely the operating conditions of one merchant compare with the operating conditions of another merchant, not only in the same city but in distant cities. When the differences between the businesses are eliminated and a like kind of business is compared with one of a similar nature, it will be found that the operating results are so close

that I am earning the reputation of being a close guesser. Just about two hours ago a gentleman whom I know well asked me what in my opinion was the average dollars of sales per order on mill business. I had not seen these particular results of this man's business, but I stated that he would probably find that his average would run in the neighborhood of $190. He smiled and showed me a memorandum which his accountant had handed him indicating that his average sales per order on this business was $193. Now the reason I bring this matter into this discussion is to illustrate how uniformly conditions and buying habits of customers work out in various parts of the country. Actuaries when preparing papers for life insurance companies do not find it necessary to establish different rates for premiums as between one State and another. Wide research has disclosed that the death rate of human beings is pretty much the same in all parts of the country. Fundamental conditions in the paper business from my experience run about as uniformly as the results disclosed by insurance actuaries, and this probably holds true with practically all business in all industries. There are certain, what appear to be, vast differences in operating results which melt away entirely upon an analysis of these results and a comparison of the fundamental conditions underlying them.

Before closing I wish to express publicly my thanks to Secretary Ridgway and appreciation for the sound advice he has given me during my connection with the Association. If I have been able to make any sort of success out of this work it has been largely due to the advice he has given me. He knows far more about cost accounting than lawyers usually do.

The Chairman: Gentlemen, we have had a rather dry and serious meeting so far this afternoon, and I remember at the last three or four meetings I attended here, we always called on a gentleman who made us laugh, and I think we are about due for a little smile. N. L. Martin is with us, and he is the secretary of the Canadian Paper Trade Association. He is one of those witty Canadians who can tell us something to make us laugh, and we can get that out of our system. Let us try it anyhow.

Mr. Martin Speaks

N. L. Martin: Mr. Chairman, and gentlemen: I never figured as a humorist before, to my knowledge, and I didn't know that I had come here today prepared to say anything that would even make you smile. I do want to say, though that I think this Association is to be congratulated, and I wish to congratulate you, Mr. President, upon the very admirable address from the president that was submitted here this afternoon. I thought it was a wonderful effort. It seemed to me, in view of what has been said here today with regard to the agitation against trade associations and against combines, et cetera, that if a copy of that address could be in the hands of every Congressman in this country, so that they could see the fine platform upon which the ethics of this Association, at any rate, are being conducted, there would be very little room for any criticism. It sounded to me more like a Masonic address, like a Masonic lecture, perhaps, than something coming from a lot of people who are combined together for the purpose of abusing the public.

While we find conditions in Canada very similar to those you have geen going through here, we are more fortunately situated in that we have practically one hundred per cent of the Fine Paper merchants, at any rate, in our association, and practically all of our mills are in an association of the mill men, and through the medium of those two associations, without having any price fixing agreements, we have been able to keep the paper trade standardized in Canada by means of the application of the very principle which your chairman so beautifully set out today, of faith in one another, hope in the future, and charity toward all.

If I could just add one little sentence quoted from the same Good Book those three words are taken from, and say if we could just apply to our business another sentence which is known as the Golden Rule, to do unto one another as we would they should do to us, I think that all the troubles we meet with in our daily life would be very largely solved. And that is after all what a trade association tries to teach, the doing unto others what we would like others to do unto us, and by the opportunity that is given to us to get to know one another better and understand one another's principles, and understand that the other fellow is up against the same problem we are up against, we are going to get along very much better than by trying to cut one another's throats. It is not very long ago since people engaged in the same line of business considered the other fellow was a black-leg, a crook and a thief, and the only place he should be should be somewhere in the penitentiary. Now, fortunately, we have grown to understand one another better, and we are beginning to forget those things and beginning to realize that after all the other fellow who is getting his bread and butter in the same way as we do, is not such a bad fellow. I suppose that after what your chairman said, I ought to tell a story, but I don't know that anything occurs to me, Mr. President, now, that would have any bearing on this particular subject. I might say, however, that people in the United States are not the only people who are up against fool legislation. I wonder if the agitators would be better satisfied if we had an avalanche of failures in, let us say, the paper business, than they would if the people engaged in the paper business got together and understood one another, not made any price agreements, but just agreed they would have enough faith in one another to handle their business in the same way. Would that, after all, be a better condition for any country, than a condition in which competition was so keen and the regard for the other fellow's position so little, that it would bring about failure on the part of all the small houses engaged in the business? We have had, for instance, one of our brilliant legislators in Canada, suggest in all seriousness that one of the worst features in connection with commercial life was the cost of selling goods, and he thought it was time the Parliament of Canada took some means to stop this tremendous cost of selling merchandise. He had found in the course of his investigation that it cost from five to twenty per cent to sell merchandise, and that this cost was very largely brought about by the expense of sending travelers over the country soliciting business, so he conceived the idea that the Parliament of Canada should pass a law prohibiting any commercial house from sending commercial travelers out to sell merchandise. That suggestion was fortunately nipped in its infancy, and needless to say, it has no chance of being put upon the Statute Books, but it just shows what fool things we have to combat.

I want to extend to you, Mr. President, and to the gentlemen here, the very heartiest greetings and expression of good will from the members of the Canadian Paper Trade Association to you all, for the success of your convention here, which is now nearly over, and to say that at our annual meetings, we would be only too glad to have any of you present, who could come, as many as possible. Our next association meeting is going to be held Montreal, and I don't know but what we could show you all a pretty good time in Montreal.

Here is a little couplet I heard that I will read you:

"Four and twenty Yankees,
Feeling mighty dry;
Went to Montreal to get a bottle of Rye.
When the Rye was opened, they all began to sing,
To Hell with Mr. Volstead! God Save the King!"

(great applause)

The Chairman: It took him a long time, but he finally put it over (Laughter.) Now we have with us another gentleman from Canada. His name is Mr. McFarland. He is from Montreal, and I thought while we have these Canadian gentlemen with

us, we might hear from them all at the same time. (Applause.)

Remarks by Mr. McFarland

Mr. MacFarland: Mr. Chairman, and gentlemen: You don't know it, but this is a unique occasion. It is the first time a Toronto man has said something good about Montreal. I want to thank you personally, I want to express the thanks of the absent Montreal members of the Canadian Paper Trade Association for the courtesy you have offered us in opening your meeting to us. It is the second convention I have attended; I came down feeling a good deal like a little boy at school. My first appearance. Your figures and data are on such a huge scale, that they are somewhat overpowering to a man who is trying to conduct business in a small country with a small population. I think you will be glad to know that things are improving in Canada. It is slow but I guess it is none the less sure on that account. We have had labor difficulties. We have had a very bad harvest to contend with, but I think we are on the mend, but I can assure you that we thoroughly hope that the United States and the National Paper Trade Association may have the most prosperous year in 1922.

Mr. Martin has told you a story in reference to Montreal. We had an occurrence there a little while ago, that I would advise you, if you have any pessimists, to send them over there. We had a delegation of people from the United States, and they had occasion to speak at one of the clubs I belong to. One of the gentlemen opened his speech by saying "When I woke up this morning and looked out of the car window at the growing crops" now, as it happens, the ground was covered with six inches of snow. And he had only been in the Province of Quebec two days! (Laughter.)

Election of Officers

The Chairman: You see, I did not miss it much with those Canadians. Gentlemen, the next business is the election of officers.

Secretary Ridgway: Pursuant to the provisions of the by-laws, your Board of Directors presents the following nominations for officers to serve for the ensuing year: for President, C. N. Bicknell, Cleveland. Vice-president in charge of the Fine Paper Division, Mr. Fritz Lindenmeyr, New York; Vice-president in charge of the Wrapping Paper Division, F. W. Powers, Boston. Treasurer, A. J. Corning.

The Chairman: Gentlemen, you have heard the nominations of the Board of Directors. Are there any other nominations?

Mr. Miller: I move the nominations be closed, and that the Secretary cast the ballot of the Association for the gentlemen named.

(The motion prevailed.)

Secretary Ridgway: The Secretary has done so, and C. N. Bicknell has been elected president for the ensuing year. (Applause.)

The Chairman: Mr. Bicknell, will you please step up here, and I will properly introduce you.

I think it is almost useless for me to acquaint you with your incoming president, because from his long association with you, you know him well. During the twenty-two years he has been connected with this industry, he has given ungrudgingly of his time and his counsel to the welfare of your association. We are indeed fortunate this afternoon to be able to ratify the nomination of Mr. Bicknell, and we are doubly forunate because Mr. Bicknell has decided to accept. Mr. Bicknell.

President C. N. Bicknell: Gentlemen, I heard Mr. Herrlinger's talk today, and the only thing I could think of was to wonder what I was going to do a year from today. They say you don't have to eat all of an egg to know that it is bad. You won't have to listen to my entire speech to know that that is bad.

Just one point I want to bring out—Association work. There are a lot of people who give one day to the National Association's work. I want those people to realize that men like Mr. O. A. Miller, Mr. Joseph T. Alling, Mr. John Leslie, and Mr. W. F. McQuillan, are spending a lot of time year after year and those men are not fond of wasting their time. If it was not right, if it was not profitable—legally, I mean now—they would not be spending their time. Gentlemen, I thank you for this honor. I appreciate it fully. I cannot tell you how much. I will do everything that I can. I want the assistance of the other people connected with the Association, and I hope a year from today the Association will be just as successful as it is today. I thank you. (Applause.)

Vice-President Speaks

The Chairman: I wonder if we could hear from the newly elected vice-president of the Fine Paper Division, Mr. Lindenmeyr? (Applause.) Mr. Lindenmeyr has evidently successfully dodged the issue; but I would like to say to the members that we had to bring quite a lot of pressure on Mr. Lindenmeyr to get him to accept this honor. He is a man with a very great amount of business duties, but at the eleventh hour he finally consented to take an official part in this organization. I am sorry he is not here, so he could tell you himself how many hours he laid awake at night to determine whether he should or should not begin in this capacity. Now, we have with us the vice-president of the Wrapping Paper Division, Mr. Powers. Frank W. Powers.

Mr. Frank W. Powers: Gentlemen, I thank you for the honor in expressing your confidence in my work during the past year. I pledge to our new president my best efforts during his administration.

The Chairman: We ought to have a few words from the treasurer who has been re-elected, contrary to his wishes. He seems to be about the only man the National Association members are willing to trust. (Laughter.) I think this is the fifth consecutive year, but every year, you will notice he has his accounts audited, and unfortunately by the same auditors. (Laughter.)

A. J. Corning: Gentlemen, I want to thank you for the honor that you have conferred upon me. It is indeed a pleasure to serve the Association. It has been a pleasant duty that I have taken great honor in.

Now, I will tell a little story that just happens to my mind, as long as stories are in order, of an old darky who was passing along through the country in the backwoods of Virginia, and he was going to Manassas. He stopped a farmer on the road and said, "Master, can you tell me, please, how far it is to Manassas?" And the man said, "Yes, it's fourteen miles." "Thank you, sir." "Get up." He went on some further and met another farmer, and stopped him, and said, 'Good morning, boss, could you please tell me how far it is to Manassas?" "Yes," the farmer said, "it is fourteen miles." "Get up." On he went for some time, and he met another farmer and he stopped him and he said, "Good morning, boss, would you please tell me how far it is from here to Manassas?" "Yes, uncle," the farmer said, "it is just about fourteen miles from here." He says, "Thank you very much, sir, get up." And then to his old hoss he said, "Well, at least we are holding our own." (Laughter.)

C. S. Proctor: Mr. President, I would like to move that a vote of thanks be extended to our retiring president.

(The motion prevailed.)

The Chairman: Mr. Herrlinger, you have a vote of thanks. Mr. Secretary, it is moved we adjourn. Is there a second to that?

(The motion prevailed, and at five minutes past four P. M., the Annual Meeting adjourned.)

MANY HANDLE WARREN PAPER CO. LINE

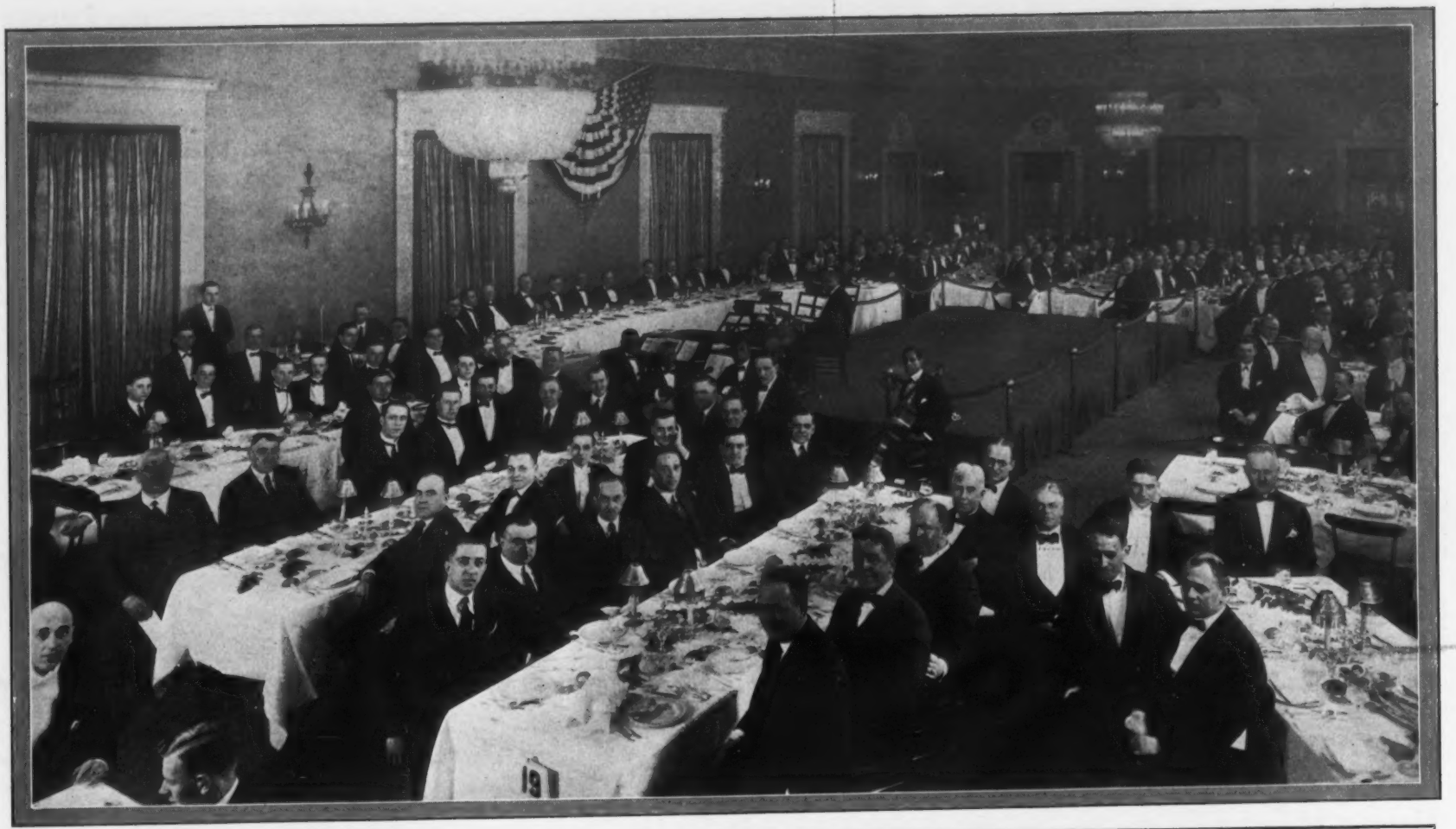
George H. Olmstead, formerly identified with the Butler Paper Company of Chicago, as a director of the firm, has severed that identity. A rumor is current in Chicago that Mr. Olmstead will shortly announce his new connection to the trade as handling the Warren Paper Company line, book and offset papers.

REGISTRATION LIST FOR PAPER WEEK IN NEW YORK

The following is the official registration list given out by the American Pulp and Paper Association, of those present at the forty-fifth annual convention of the Association, at the Waldorf Astoria, New York, April 10-14, 1922:

G. G. Abernethy, International Paper Co.
L. M. Alexander, Nekoosa-Edwards Paper Co.
A. L. Allen, General Electric Co.
P. M. Allen, Detroit Sulphite Pulp & Paper Co.
L. C. Anderson, W. B. Oglesby Paper Co.
C. B. Andrews, Taylor-Wharton Iron & Steel Co.
W. H. Artz, Westinghouse Electric & Mfg. Co.
A. C. M. Azoy.
P. R. Bachman, Warren Mfg. Co.
Chas. Bacon.
C. W. Baker, Bedford Pulp & Paper Co.
Norman Bardeen, Lee Paper Co.
W. J. Barns, Warren Mfg. Co.
J. V. Baron, Sherman Paper Co.
L. Barslous, Union Bag & Paper Corp.
L. G. Bean, The Bristol Co.
Geo. F. D. Bearce, News Print Service Bureau.
Edward Beck, Canadian Paper & Pulp Assn.
F. K. Becker, Bird Machine Co.
F. N. Becker, Westfield River Paper Co.
Thomas Beckett, Beckett Paper Co.
Hubb Bell, U. S. Testing Co., Inc.
M. D. Bensley, Frontier Bronz Corp.
O. L. Berger, G. D. Jessen Co.
J. N. Bergstrom, Bergstrom Paper Co.
M. Berlau, Berlau Paper House.
R. B. Best, Chemical Paper Co.
George L. Bidwell, Warren Mfg. Co.
H. H. Bishop, Sec., Pulp Mfrs. Assn.
Gordon Blanchard, Crocker McElwain Co.
P. S. Bolton, Huron Milling Co.
L. M. Booth, Booth Chemical Co.
R. L. Bosworth, Crocker McElwain Co.
W. M. Bovard, Package Paper & Supply Corp.
Chas. W. Boyce, U. S. Forest Service.
F. M. Boyer, Harmon Paper Co.
Franklin E. Bragg, Orono Pulp and Paper Co.
B. Branch, Canadian Barking Drum Co.
W. E. Brawn, Pejepscott Paper Co.
H. S. Bristol, Baeder, Adamson & Co.
W. F. Bromley, Hammermill Paper Co.
D. K. Brown, Neenah Paper Co.
H. C. Brown, Nat. Gummed & Coated Co.
H. H. Brown, Hollingsworth & Vose Co.
H. S. Brown, Yellow Pine Paper Co.
Wm. F. Brunner, Paterson Parchment Paper Co.
E. S. Bryant, Boston, Mass.
O. P. Bryant, Laurentide Co.
J. G. Bullard, Crocker-McElwain Co.
K. R. Bunce, Chem. Paper Mfg. Co.
H. Burgee, Neenah Paper Co.
F. T. Burkhardt, Parsons Paper Co.
A. Burr, Mill Agent, Arthur M. Burr.
Edw. H. Bush, Crane & Co.
S. L. Bush, Crocker-McElwain Co.
C. A. Buskirk, Wolverine Paper Co.
O. M. Butler, American Forestry Assn.
G. J. Cadwell, American Writing Paper Co.
Ross Campbell, Proctor & Gamble.
H. R. Cantine, Martin Cantine Co.
P. T. Carson, Bureau of Standards.
J. J. Case, Baker Mfg. Corp.
H. A. Casey, Chemical Mfg. Co.
E. S. Catlin, R. B. Wolf Co.
M. L. Caust, Tileston Hollingsworth Co.
E. C. Chadwick, American Writing Paper Co.
O. T. Chalon, Kuggroff & Co.
R. F. Chapin, Millers Falls Paper Co.
L. G. Chelf, Wortendyke Mfg. Co.
H. L. Churchill, Finch, Pruyn & Co.
John M. Clancy, Southeastern Paper Co.
Frederick Clark, Pejepscott Paper Co.
Wm. Clark, General Electric Co.
M. Cline, International Paper Co.
P. W. Codwise, Byron Weston Co.
A. D. Coffin, C. A. Dexter & Sons, Inc.
A. E. Cofrin, Ft. Howard Paper Co.
C. W. Collins, Cherry River Paper Co.
Grellett Collins, Dill & Collins Co.
H. S. Collins, Dill & Collins Co.
Lewis T. Condon, Continental Paper & Bag Mills
C. H. Cooley, Taylor-Logan Co., Papermakers.
P. T. Coolidge, Bangor, Me.
S. P. Copeland, Eastern Mfg. Co.
A. S. Costler, Texas Gulp Sulphur Co.
F. N. Countiss, Martin Cantine Co.
Edw. B. Cowles, Bedford Pulp & Paper Co.
J. H. Coy, Flambeau Paper Co.
C. H. Coy, C. H. Dexter & Sons.
Geo. E. Crafts, Orono Pulp & Paper Co.
C. A. Crocker, Crocker-McElwain Co.
D. A. Crocker, Eastern Mfg. Co.
W. W. Cronkhite, General Electric Co.
R. S. Crump, Standard Paper Mfg. Co.
F. A. Curtis, Bureau of Standards.
H. H. Curtis, Consolidated Water Power & Paper Co.
A. G. Darling, General Electric Co.
R. S. Davis, Dells Paper & Pulp Co.
C. W. Dearden, Strathmore Paper Co.
J. A. DeCew, Process Engineers, N. Y. C.
W. F. Dewey, B. D. Rising Paper Co.
J. R. Diggs, Albemarle Paper Mfg. Co.
J. J. C. Downey, National Paper Products Co.
A. B. C. Drew, Fairpoint Corp.
J. R. Dufford, Paterson Parchment Paper Co.
Theo. W. Dunn, Detroit Sulphite Pulp & Paper Co.
A. H. Dwight, Hawthorne Paper Co.
Geo. A. Eastman, Parsons Paper Co.
W. J. Eisner, Newark Paraffin & Parchment Paper Co.
H. D. Eliason, Newton Falls Paper Co.
H. W. Ellerson, Albemarle Paper Mfg. Co.
G. C. Emigh, York Haven Paper Co.
I. N. Esleeck, Esleeck Mfg. Co.
D. C. Everest, Marathon Paper Mills Co.
R. D. V. Ewing, American Writing Paper Co.
R. R. Fensk, N. Y. State College of Forestry.
Robert S. Finney, McNamee Kaolin Co.
Paul S. Fiske, Parker-Young Co.
J. W. Fitzgerald, Canadian Export Paper Co., Ltd.
A. M. Fletcher, Fletcher Paper Co.
Harry Fletcher, Fletcher Paper Co.
F. D. Fralick, Kimberly-Clark Co.
B. A. Franklin, Strathmore Paper Co.
Arthur Freeman, Ft. Howard Paper Co.
H. W. French, Hammermill Paper Co.
George A. Galliver, American Writing Paper Co.
Geo. K. Gibson, Wausau Sulphate Fibre Co.
John Gibson, Jr., Wrenn Paper Co.
G. W. Gilkey, Michigan Paper Co.
A. G. Gilman, Allied Paper Mills.
P. H. Glatfelter, P. H. Glatfelder Co.
J. D. Goldberg, Hamersley Mfg. Co.
G. H. Gleason, Boston, Mass.
I. Gordon, Lee Paper Co.
John H. Graff, Brown Paper Co.
M. H. Grassly, Strathmore Paper Co.
A. B. Green, Parker Young Co.
H. B. Greene, Niagara Paper Mills.
Martin L. Griffin, Mt. Hope Finishing Co.
R. D. Hamilton, W. C. Hamilton & Sons.
E. K. Hanly, Great Northern Paper Co.
E. J. Hansen, Fort Howard Paper Co.
H. H. Hanson, Eastern Mfg. Co.
R. O. Harper, B. D. Rising Paper Co.
T. W. Harrington, American Writing Paper Co.
M. Harrison, Hammermill Paper Co.
A. R. Harvey, Gardner-Harvey.
R. S. Hatch, Hamersley Mfg. Co.
E. A. Haynes, Port Huron Sulphite Paper Co.
R. A. Hayward, Newton Falls Paper Co.
W. L. Heath, H. G. Craig Co.
C. H. Helvey, Black-Clawson Co.
Geo. L. Henderson, Pejepscott Paper Co.
C. L. Higgins, Finch Pruyn Co.
R. P. Hill, Hamersley Mfg. Co.
H. H. Holden, Vera Chemical Co.
Spencer M. Holden, Crocker McElwain Co.
Geo. S. Holmes, Yellow Pine Paper Mill Co.
James Horne, New York & Pa. Co.
R. S. Hosmer, N. Y. State College of Agriculture.
B. K. Hotchkiss, Hooker Electrical Co.
J. H. Houghton, Thwing Instrument Co.
R. T. Houk, Mead Pulp & Paper Co.
Willis H. Howe, Knowlton Bros.
A. V. Howland, Tileston & Hollingsworth.
F. E. Hummel, Hummel-Rose Fibre Corp.
J. P. Hummel, Hummel-Rose Fibre Corp.
C. W. Hurtubis, Hammermill Paper Co.
John E. A. Hussey, International Paper Co.
S. W. Jacobs, Electro Bleaching Gas Co.
H. H. Jensenius, Calvin L. Robertson.
J. D. Jenssen, J. D. Jenssen Co.
W. O. Johnson, Strathmore Paper Co.
R. S. Johnston, Pusey & Jones Co.
W. D. Judd, Hampshire Paper Co.
R. T. Judson, Flower City Tissue Mills.
I. F. Kahn, Capitol Paper Co.
Joseph Kastner, American Writing Paper Co.
Harry Kay, Price Bros. & Co.
Virgin K. Kellogg, Newton Falls Paper Co.
A. J. Kennedy, Sandy Hill Iron & Brass Wks.
Amos S. Kennedy, Alling & Cory Co.
C. H. Kent, Papermakers' Chemical Co.
Helen Kiely, American Writing Paper Co.
Jacob Kindleberger, Kalamazoo Vegetable Parchment Co.
Kenneth T. King, Dupont De Nemours Co.
H. H. Keiler, Wortendyke Mfg. Co.
John Kepke, Jr., SKF Industries.
Phillips Kimball, Liberty Paper Co.
Charles Kinnerman, Falulah Paper Co.
C. E. Kinney, Hercules Powder Co.
S. C. Knode, Albemarle Paper Mfg. Co.
Paul Koenig, Continental Paper & Bag Mills.
H. L. Kutter, Black-Clawson Co.
A. W. Lamb, Warren Mfg. Co.
W. W. Langtry, District of Columbia Pa. Mfg. Co.
D. E. Lauterburn, Pejepscott Paper Co.
W. J. Lawrence, Western Paper Making Chemical Co.
R. E. Leake, Niagara Paper Mills.
R. W. Leeper, Managing, Engineering & Development Co.
S. G. Leitch, Gummed Prod. Co.
C. E. Libby, N. Y. State College of Forestry.
Harry Liebeck, Scott Paper Co.
C. E. Lincoln, American Writing Paper Co.
H. E. Lindquist, Chemical Paper Mfg. Co.
J. Linton, Pawtucket Glazed Paper Co.
R. H. Lisbet, Price Bros.
M. B. Littlefield, Arrowhead Mills.
Wm. Lodge, Forest Products Laboratory.
R. D. Loewing, J. D. Jenson Co.
E. R. Low, Beaver Board Co.
A. George Lutz, Invincible Paper & Pulp Co.
B. T. MacBain, Nekoosa-Edwards Paper Co.
T. B. McCabe, Scott Paper Co.
A. A. MacDiarmid, Norwich, Conn.
C. McDowell, McDowell Paper Mills.
H. G. McDowell, Pusey & Jones Co.
Jas. D. MacLaurin, Liberty Paper Co.
J. P. MacLaurin, St. Maurice Paper Co.
L. W. Mahle, Ohio Box Board Co.
Fred'k MacNicoll, The Racquette River Paper Co.
J. E. McQueen, Wrenn Paper Co.
J. W. Magee, Westinghouse Electric Co.
Carl Magnus, Standard Paper Mfg. Co.
F. W. Main, Worthy Paper Co.
Ralph Mair, Dill & Collins Co.
E. W. Mantz, A. M. Collins Mfg. Co.
G. Frank Merriam, Holyoke Card & Paper Co.
A. F. Meyer, Consulting Engineer.
I. J. Marcuse, Bedford Pulp & Paper Co.
M. E. Marcuse, Bedford Pulp & Paper Co.
Walter J. Meyer, Superior Paper Co.
Albert M. Miller, Central Ohio Paper Co.
H. J. Miller, Hartford City Paper Co.
J. S. Miller, Jr., Mead Pulp & Paper Co.
A. Y. Meeker, Alverene Stone Co.
R. N. Miller, Forest Products Paper Co.
W. H. Millspaugh, Sandusky Foundry & Machine Co.
L. O. Moffitt, Taylor-Wharton Iron & Steel Co.
C. L. Moreau, Naylor & Co.
F. L. Moore, Watertown, N. Y.
H. A. Morrison, Olivier Continuous Filter Co.
F. Mossteller, Kalamazoo Vegetable Parchment Co.
M. E. Moyer, West Carrollton Parchment Co.
D. W. I. Mulford, Crane & Co.
J. B. Nash, Nekoosa-Edwards Paper Co.
L. E. Nash, Nekoosa-Edwards Paper Co.
E. H. Nease, Beloit Iron Works.
A. H. Nevins, Miami Paper Co.
W. A. Nevling, Huron Milling Co.
A. W. Nickerson, Process Engineers.
W. L. Nixon, Chemical Paper Mfg. Co.
C. R. Oberley, Munising Paper Co.
E. A. Oberweiser, Whiting Plover Paper Co.
J. H. O'Connell, Superintendents' Association.
J. O'Donoghue, Laurentide Co.
C. J. O'Regan, Grand Lake Co.
A. E. Clafsen, Poland Paper Co.
E. Olsson, Chesapeake Corp.
R. H. Palmore, Yellow Pine Paper Mills.
L. J. Parant, St. Croix Paper Co.
H. O. Parker, French Paper Co.
R. T. Parker, Naylor & Co.
R. L. Pease, Hawthorne Paper Co.
H. B. Peirson, State Dept. of Forestry.

Philips Dennett, Bird Mach. Co.
Joe Firie, Neenah Paper Co.
Robert W. Post, Westport Paper Co.
John W. Powell, Allied Paper Mills Co.
Otto Press, Consoidated Water Power & Paper Co.
J. H. Price, Price Bros.
B. Prins, National Aniline & Chemical Co.
S. M. Ramsey, Waterproof Paper & Board Co., Cincinnati, Ohio.
Z. W. Ranck, Crystal Tissue Co., Middletown, O.
W. D. Randall, Champion Coated Paper Co., Hamilton, Ohio.
E. O. Reed, Bureau of Chemistry, Washington.
E. A. Rees, F. C. Huyck & Sons, Albany, N. Y.
I. H. Reid, Diem & Wing Paper Co., Cincinnati, Ohio.
H. H. Reynolds, B. D. Rising Paper Co., Housatonic, Mass.
C. F. Rhodes, International Paper Co., Glens Falls, N. Y.
R. E. Rindfusz, American Writing Paper Co., Holyoke, Mass.
T. H. Savery, Nash Engineering Co., Bird Machine Co., Chicago.
Wm. H. Savery, Nash Engineering Co., Bird Machine Co., Chicago.
I. Steward Robinson, M. Gottesman & Co., Inc., 18 East 41st Street.
H. W. Rogers, Gen. Electric Co., Schenectady, N. Y.
S. S. Rogers, Chemical Paper Co.
Walter S. Rooney, Albany Felt Co., Albany, N. Y.
J. O. Ross, J. O. Ross Engineering Co., New York.
T. W. Ross, Hummel Ross Fibre Corp., Hopewell, Va.
J. V. Rowland, The Rowland Company, Louisville, Ky.
J. M. Rubinstein, Grand Lake Co., 280 Madison Ave., New York.
J. D. Rue, Forest Prod. Lab., Madison, Wis.
D. B. Rushmore, Gen. Electric Co., Schenectady, N. Y.
J. R. Russell, Marathon Paper Mills Co., Rothschild, Wis.
Frank C. Sammet, Crane & Company, Dalton, Mass
H. D. Schmidt, Schmidt & Ault Paper Co., York, Pa.
C. C. Schneider, Knowlton Bros., Watertown, N.Y.
S. E. Seaman, Stamscott Co., Hopewell, Va.
P. C. Servass, Bryant Paper Co., Kalamazoo, Mich.
M. B. Shaw, Bureau of Standards, Washington.
John B. Shepherd, Peninsular Paper Co., Ypsilanti, Mich.
A. J. Siegel, M. Gottesman & Co., Inc., 18 East 41st Street, New York City.
F. R. Sisson, Racquette River Paper Co., Potsdam, N. Y.
F. T. E. Sisson, Racquette River Paper Co., Potsdam, N. Y.
Lewis H. Sisson, Racquette River Paper Co., Potsdam, N. Y.
R. L. Sisson, Jr., The Racquette River Paper Co., Potsdam, N. Y.
H. J. Skinner, Skinner, Sherman & Esslener, Inc., 248 Boylston, Boston, Mass.
D. A. Smith, District of Columbia Pa. Mfg. Co., Washington, D. C.
G. K. Smiths, New York & Pa. Co.
Geo. H. Snedeker, Master Reporting Co., New York City.
Ralph N. Snell, Papermakers Chemical Co., Holyoke, Mass.
Fred W. Snyder, Warren Mfg. Co., Woolworth Bldg., New York City.
H. R. Snyder, Westinghouse Elec. Co., Albany, N. Y.
C. W. Spickerman, Whiting-Plover Paper Co., Stevens Point, Wis.
W. W. Spratt, Westinghouse Elec. Co., Pittsburgh.
L. M. Start, Rice & Clark & Bail.
J. N. Stephenson, Pulp and Paper Magazine, Montreal, Canada.
L. T. Stephenson, Mountain Mill Paper Co., Lee, Mass.
L. B. Steward, 75 Beekman Street, New York City.
Ben. S. Stewart, Eastern Mfg. Co., Chicago.
Ira T. Stroud, Lee Paper Co., Vicksburg, Mich.
P. B. Stull, Stamscott Co., Hopewell, Va.
O. R. Summerville, Knowlton Bros., Watertown, N. Y.
Edwin Sutermeister, S. D. Warren Co., Cumberland Mills, Me.
J. G. Sutton, Standard Paper Mfg. Co., Richmond Va.
R. P. Swift, Paper Trade Journal, 10 East 39th Street, New York City.
Roger B. Taft, Hammermill Paper Co., New York City.
Roger B. Taft, Hammermill Co., New York City.
C. R. Tait, Hammermill Paper Co., Erie, Pa.
F. E. Taylor, Taylor-Logan Co.
H. S. Taylor, Managing, Engineering & Development Co., Dayton, Ohio.
O. B. Towne, Waxed Paper Mfrs. Assn.
E. O. Tucker, Crocker, McElwain Co., Holyoke, Mass.
H. B. Wolf, R. B. Wolf Co., 42 Broadway, New York City.
H. M. Van Valkenburgh, Mountain Mill Paper Co., Lee, Mass.
B. A. Van Winkle, Hartford City Paper Co., Hartford City, Ind.
F. P. Veitch, Bureau of Chemistry, Washington, D. C.
J. M. Wade, General Electric Co., Boston, Mass.
Chas. K. Wadham, Z. & W. M. Crane Co., Dalton, Mass.
Ralph Waggoner, Wheaton, Ill.
Thos. Compton Walsh, Hollingsworth & Vose Co, West Groton, Mass.
G. A. Ware, News Print Service Bureau, 342 Madison avenue, New York City.
J. M. Ward, Detroit Sulphite Pulp & Paper Co., Detroit, Mich.
E. B. Wardle, Laurentide Co., Quebec, Canada.
D. F. Warren, Warren Parchment Co., Dexter, N. Y.
O. L. E. Weber, Watab Pulp & Paper Co., Sartell, Minn.
P. F. Wehmer, Electrical Testing Laboratories, New York City.
C. S. Weir, Hammermill Paper Co., Erie, Pa.
M. A. Wellington, Fletcher Paper Co., Alpena, Mich.
C. J. West, Naticnal Research Co., Washington, D. C.
F. S. White, Pequannock Valley Paper Co., Butler, N. J.
J. B. White, Pequannock Valley Paper Co., Butler, N. J.
L. J. White, Holden Paper Co., Newburgh, N. Y.
C. W. Whitehouse, Abitibi Pulp & Paper Co., Iroquois Falls, Ont.
C. W. Whiting, American Writing Paper Co., Chicago, Ill.
F. P. Whitley, Munising, Mich.
Curtis G. Williams, South Ontario Paper Co., International Falls, Minn.
W. V. Williams, Beckett Paper Co., Hamilton, Ohio.
Mr. and Mrs. G. E. Williamson, Strathmore Paper Co., Mittineague, Mass.
Ellwood Wilson, Laurentide Paper Co., Grand Mere, Que.
J. B. Wilt, Parsons Pulp & Lumber Co., Parsons, W. Va.
F. E. Winslow, General Electric Co.
W. S. Winslow, A. M. Collings Mfg. Co., Philadelphia, Pa.
A. D. Wood, The Champion Fibre Co., Canton, N. C.
J. B. Woodruff, Holyoke, Mass.
Edward Wright, High Falls Pulp & Paper Co., Chateaugay, N. Y.
L. M. Yoerg, Carew Mfg. Co., So. Hadley Falls, Mass.
C. C. Young, Pejepscott Paper Co., Brunswick, Me.
J. D. Zellerbach, National Paper Products Co., Carthage, N. Y.
C. R. Andrews, Andrews Bros. Paper Co.
A. F. Allen, Tidewater Paper Co.
Geo. R. Atkinson, Scott Paper Co.
K. H. Alderman, Foreign Paper Mill.
J. W. Quimby, Allied Paper Mills.
W. S. Boyd, Columbia Valley Paper Co.
I. L. Bagg, Millers Falls Paper Co.
R. D. Bertsche, Miamisburg Paper Co.
R. C. Brown, Kimberly-Clark Co.
Louis Bloc, Crown Willamette Paper Co.
F. R. Buchholz, Paper Novelty Co.
M. Browning, Ohio Wax Paper Co.
R. H. Baker, Taylor-Wharton Iron & Steel Co.
Geo. Barsky, Columbia University.
F. L. Barstow, Falulah Paper Co.
James Richard Carter, Nashua Gummed & Coated Paper Co.
Canadian Export Paper Co., Ltd.
R. S. Carraway, The Paper Industry, Chicago.
H. V. Clark, Malone Paper Co.
A. R. Cornwall, Malone Paper Co., Watertown.
W. M. Crane, Jr., Crane & Co., Dalton, Mass.
F. G. Crane, Jr., Crane & Co., Dalton, Mass.
Dexter D. Coffin, C. H. Dexter & Sons, Inc., Windsor Locks, Conn.
E. A. Carter, Nashua Gummed and Coated Paper Co., Nashua, N. H.
Elmer B. Cooley, Parsons Paper Co., Holyoke, Mass.
H. R. Davenport, Wolverine Paper Co., Otsego, Mich.
R. B. Donnelley, Central Waxed Paper Co., Chicago, Ill.
Edward Dahill, Jr., Freight Container Bureau, Amer. Railway Assn., 30 Vesey street, New York City.
F. M. Dickinson, E-Z Opener Bag Co., Decature, Ill.
C. E. Devonshire, Dennison Mfg. Co., Framingham, Mass.
A. E. Devieah, U. S. Testing Co., Inc., 316 Hudson street, New York.
A. B. Daniels, L. L. Brown Paper Co., Adams, Mass.
A. W. Esleeck, Esleeck Mfg. Co., Turners Falls, Mass.
A. S. Guggenheimer, United Mfg. Co., New York City.
H. W. Guettler, Fibre-Making Processes, Chicago.
H. B. Gordon, U. S. Testing Co., New York City.
C. Gronseth, Poland Paper Co., Mechanic Falls, Me.
W. C. Gouldman, Chesapeake Corporation, West Point, Va.
B. Hopper, Kalamazoo Vegetable Parchment, Kalamazoo, Mich.
H. L. Harrington, Berkshire Hills Paper Co., Adams, Mass.
H. W. Hixon, Chapin & Gould Paper Co., Springfield, Mass.
J. W. Hagar, Crane & Co., Dalton, Mass.
Eugene F. Hurd, Hamersley Mfg. Co., Garfield, N. J.
D. H. Hanoy, Coolidge Company, Bangor, Me.
H. E. Handke, Rhinelander Paper Co., Rhinelander, Wis.
Joseph E. Holmes, Crocker-McElwain Co., Holyoke, Mass.
Frank Larson, Foreign Paper Mills, New York City.
A. Lapidus, Union Bag & Paper Co., Hudson Falls, N. Y.
E. P. Lowe, Falulah Paper Co., Fitchburg, Mass.
E. F. Lowe, Falulah Paper Co., Fitchburg, Mass.
Peter F. Loftus, De Grasse Paper Co., Pyrites, N. Y.
C. H. McFarlane, McFarlane, Son & Hodgson, Ltd., Montreal, Canada.
Chas. McKernon, B. D. Rising Paper Co., Housatonic, Mass.
W. J. Norton, American Writing Paper Co., Holyoke, Mass.
G. S. Gaylord, Menasha Printing & Carton Co., Menasha, Wis.
Morgan Hopper, Kalamazoo Vegetable Parchment Co., Kalamazoo, Mich.
G. E. Montague, Tileston & Hollingsworth Co., Boston, Mass.
N. N. Mcneypenny, Jr., Alberene Stone Co., New York City.
Ralph H. McKee, Columbia University, New York City.
W. S. McClellan, P. H. Gladfelter Co., Spring Grove, Pa.
T. R. H. Murphy, 551 Rockaway Street, Tottenville, S. I.
O. A. Miller, West End Paper Co., Columbus, Ohio.
S. B. Monroe, Allied Paper Mills, Kalamazoo, Mich.
Arthur W. Moore, Shawmut Waxed Paper Co., Hollisten, Mass.
Wm. W. Ormsbee, President, Giant Paper Products Co., New York City.
A. N. Waring, Bayless Mfg. Corp., New York City.
A. J. Stewartson, Wrapping Paper Mfrs. Service Bureau, New York.
C. H. Sisson, Racquette River Paper Co., Potsdam, N. Y.
Wm. H. Shuart, Springfield Glazed Paper Co., Springfield, Mass.
C. Southworth, Paper Division Bureau of Foreign and Domestic Commerce, Washington, D. C.
R. O. Sternberger, Tidewater Paper Co., Brooklyn, N. Y.
C. F. Sisson, Allied Paper Mills, Kalamazoo, Mich.
M. C. H. Sims, Sec., Giant Paper Products Corp.
Philip W. Porter, Taylor-Wharton Iron & Steel Co., 30 Church street, New York City.
C. P. Robinson, The Borregaard Co., 200 5th avenue, New York City.
George A. Smith, New York-New England Co., Holyoke, Mass.
R. C. Pierce, Crane & Co., Dalton, Mass.
Chas. H. Wooster, Munising Paper Co., Munising, Mich.
Charles P. Randall, Parsons Paper Co., Springfield, Mass.
B. D. Rising, B. D. Rising Paper Co., Housatonic, Mass.
A. F. Schenkleberger, Safepack Mills, Boston, Mass.
H. H. Smith, Hamersley Mfg. Co., Garfield, N. J.
Donald K. Pattillo, Hamersley Mfg. Co., Garfield, N. J.
E. A. Jones, Tarentum Paper Mills, Pittsburgh, Pa.
John Splangenberg, Poland Paper Co., Mechanic Falls, Me.
Clifford Patch, Orono Pulp & Paper Co.
C. L. Winter, Claremont & Groveton Paper Co., Claremont, N. H., Groveton, N. H.
C. F. Post, E-Z Opener Bag Co., South Bend, Ind.
Albert Smith, Keith Paper Co., Turners Falls, Mass.
Jeb Taylor, French Paper Corp., Roanoke Rapids, N. C.
I. O. Van Duzer, Louis De Jonge & Co., 71 Duane street, N. Y.
S. B. Wardwell, West End Paper Co., Carthage, N. Y.
E. J. Pope, Charlton & Pope, Montreal, Canada.
Chas. F. Wayte, Skinner Engine Co., Erie, Pa.
C. A. Woodcock, Fitch-Prine Co., Glens Falls, N. Y.
H. Z. Schniewind, Foreign Paper Mills, New York City.
N. N. Fowler, Hampden Glazed Paper Co., Holyoke, Mass.
I. J. Frank, 436 Canal street, New York City.
W. S. Eoply, Hammermill Paper Co., Erie, Pa.
I. N. Esleeck, Esleeck Mfg. Co., Turners Falls, Mass.



ANNUAL BANQUET OF THE WASTE MERCHANTS' ASSOCIATION OF NEW YORK, HOTEL COMMODORE, WEDNESDAY EVENING, APRIL 12.

Approximately two hundred and fifty members and guests of the Waste Merchants' Association of New York and their associates held their annual banquet and jubilee in the East Ball Room of the Commodore, Wednesday night. Despite a considerable tardiness in getting started, the spirits of the crowd were unabated, and it was a merry throng that smiled up at the camera for the flashlight photo.

A five-piece jazz orchestra of Southern darkies played intermittently throughout the evening and entertained with occasional singing and dancing acts. The most elaborate part of the program, however, was in the form of a brilliant cabaret performance which lasted over an hour. The affair was characterized by such a spirit of *camaraderie* and utter relaxation from business worries as is seldom witnessed in an assemblage of its type.

Ontario Paper Makers' Safety Association Meets

George Carruthers, President of the Interstate Tissue Mills Co. Is Chosen to Head the Association for Another Year and A. P. Costigane of Toronto, Is Retained as Secretary and Engineer—Great Interest Has Been Taken by the Employees of the Mills in the Accident Prevention Competitions and as a Result, Some Surprisingly Good Records Have Been Made — A. P. Costigane Re-elected Engineer.

The annual meeting of the Ontario Pulp and Paper Makers' Safety Association, which was held in Toronto on April 6, was of an encouraging character and the gathering was well attended. George Carruthers, who is president of the Interlake Tissue Mills Company and also president of the association for the past three years, presided. It is gratifying to report that the number of fatal accidents in the forty pulp and paper mills of Ontario during 1921 was only nine as compared with 17 in 1920, a decrease of 47 per cent. In accidents of a non-fatal character there was also a splendid showing during 1921 as compared with 1920, an improvement of 17.31 per cent in frequency and 18.44 per cent in severity. The safety competition among the mills for silver shields and commemorative flags also aroused much interest in safety work and will be continued another year.

There are several other features of interest which are reviewed in the annual reports of President Carruthers, and A. P. Costigane, of Toronto, Engineer and Secretary of the Ontario Pulp and Paper Makers' Safety Association.

C. Nelson Gain, of the Don Valley Paper Mills, Toronto, was elected president of the association for the coming year, being raised from the vice-presidency. H. F. E. Kent of Toronto, was appointed vice-president. Mr. Kent is president of the Kinleith Paper Mills of St. Catharines and vice-president of the Canadian Pulp and Paper Association.

Election of Officers

The directors for 1921 were all re-elected as follows: George Carruthers, Interlake Tissue Mills Company, Toronto; I. H. Weldon, Provincial Paper Mills Company, Toronto; Col. C. H. L. Jones, Spanish River Pulp and Paper Mills, Salt Ste. Marie; L. R. Wilson, Abitibi Power and Paper Company, Iroquois Falls and P. J. Murer, Riordon Company, Hawkesbury. A. P. Costigane, of Toronto was again chosen as secretary and engineer of the association.

Mr. Carruthers Reviews Year's Work

President George Carruthers, said that 1921 would long be remembered by the pulp and paper industry of Canada. The change from the peak of prosperity to the depth of depression was so sudden as to almost take away one's breadth. He, however, stated that the mills in Ontario were conservatively managed and while they all suffered from lack of orders, reduction in market price, drop in inventory values, etc., they had practically all weathered the storm and were in a better position today than ever to compete in the world's markets. Mr. Carruthers touched upon the progress of the safety movement and the great interest which had been taken in the trophies offered for competition in connection with accident prevention. He referred to the beautiful shields and commemorative silk flags offered as awards, the mills being divided into two classes "A." employing over 200 hands—and "B." less than 200 hands. In the former class the Dryden Pulp and Paper Company of Dryden, was the winner while among the smaller mills the Don Valley Paper Company of Toronto, captured the prize. A decided improvement had been shown in the accident record for the past year and Mr. Carruthers said that he hoped greater imrovement would take place during 1922. A Safety calendar had also been issued, suitably illustrated. A feature of this calendar was the emphasis placed on accidents in the home and the necessity of parents taking more pains to inculcate safety habits in children from the infantile stage on. Mr. Carruthers also called attention to the fact that there had been no change in the scope of the Workmen's Compensation Act during 1921. He said a demand was being made by labor interests to increase the scale of compensation from 66⅔ per cent of earnings to 75 per cent of earnings during disability. Legislation to accomplish this purpose was being pressed for by the labor members in the Ontario parliament and was strongly opposed by the Canadian Manufacturers' Association on behalf of the manufacturers. Mr. Carruthers referred to the fact that much dissatisfaction prevailed with the appointment of a labor nominee on the Board on the ground that a promise had been given the manufacturers by the Government that, if a labor representative was appointed, the manufacturers should also have a nominee. The latter are now agitating for a reorganization of the Board and to have an act passed increasing the personnel from three to five. In the event of such legislation going through the manufacturers will probably be asked to nominate a man to fill one of the positions created.

The audited statement of receipts and disbursements showed the cost of running the Association during the year amounted to $5,129.28 as compared with $4,964.55 for the year 1920. The figures for 1921 included an item of $201.88 for competition shields and flags. The financial statement showed that the affairs of the Association continue to be carried on very economically, said Mr. Carruthers in conclusion.

Report of Secretary and Engineer

A. P. Costigane of Toronto, secretary and engineer of the Association, in his report, said:

The period under review in this report viz:—the year 1921, might aptly be described as the "Halt & Study" year of the Canadian Pulp and Paper Industry. During the previous two or three years everything was on the boom. The price of paper soared, wages, raw material and production soared, in fact everything soared with the exception of efficiency and quality. The question was not how cheaply could pulp and paper of good quality be produced, but how much extra production could be obtained to supply the ever increasing demands, irrespective in some cases of quality or cost. Two or three years of such trade conditions is sure to breed doubtful habits both in employer and employee, and when the slump came involving price reduction and partial production, both employers and employees found it necessary to "Halt & Study" their positions. Practically the whole of 1921 was taken up re-adjusting values, and writing off inventory losses. For-

tunately in the pulp and paper industry these adjustments were made with the minimum of disagreement between those who employ and those who work. Prices, wages and in some cases raw material seem now to have reached rock bottom and indications point to fairly steady production during the current year.

Such being the conditions ruling in the industry as a whole, the Safety movement came in for its share of hard knocks. Fortunately the directors of the Association, foreseeing a period of stagnation, wisely inaugurated an Accident Prevention Competition, the prizes taking the form of Shields and Flags. This competition which appealed strongly to the sporting instincts of employees, served to keep interest alive in the majority of the mills, and proved a great success. The mills were divided into two classes. Class A. employing 200 people and up, and Class B. employing under 200 people. The Class A. trophy was won by the Dryden Paper Co., Ltd., with a record of 24 non-fatal accidents involving lost time amounting to 374.5 days, equal to 2.31 days lost time per full time worker. The Class B. trophy was won by the Don Valley Paper Company Ltd., with a record of 1 non-fatal accident, involving lost time amounting to 1 day equal to .023 days lost per full time worker. These mills will, therefore, each be presented with a Shield and a Flag. The shields will remain in their possession during the current year, but the flags will be their property for all time, and will serve as a daily reminder of their success in heading the accident competition during the year 1921. The competition is now in its second year and judging from the queries put to the writer by employees, the trophies should be even more keenly fought for this year than last.

Employees Meetings Were Fewer

Owing to unsettled conditions, fewer meetings of employees were held. In a number of mills, however, meetings of superintendents and foremen were convened for the purpose of reviewing the position of Safety education, and securing their assistance and co-operation in awakening interest in the Safety Competition. Meetings of foremen are now much more interesting and satisfactory than in the past. It is now a rare thing for a superintendent or a foreman to oppose anything being done to prevent accidents. They have come to realize that they are to a certain extent responsible for carelessness or ignorance of hazards on the part of the men under their control, and are doing their share in instilling careful and cleanly habits in their men.

Workmen's Compensation Board's Report, 1920

The Board's report for 1920 shows an increase in accidents paid for in all industries from 28.788 non-fatal and 197 fatal in 1919 to 37.443 non-fatal and 219 fatal in 1920, or an increase of 30.06 per cent. in non-fatal and 11.16 per cent in fatal accidents. Medical aid only accidents increased from 9886 in 1919 to 14.126 in 1920, equal to 42.8 per cent. The writer has not been able to secure information as to the total number of full time workers in all industries during 1920, and so cannot make a comparison from that angle.

Accidents in Pulp and Paper Mills

The total number of accidents compensatable and non-compensatable for the year 1921, is 1,203, exclusive of 9 fatal accidents, involving lost time amounting to 20.759.5 days compared with 1,455 non-fatal and 17 fatal accidents during 1920 with lost time of 25.453 days. These figures show an improvement of 17.31 per cent in frequency and 18.44 per cent in severity in the case of non-fatal accidents. Fatal accidents decreased by 47 per cent.

During the year 1921 seven new mills were added to the list. These new mills were responsible for 81 accidents involving lost time of 375 days.

These figures are encouraging in so far as they indicate that the peak has been reached both in frequency and severity and the tend now is in the downward direction. It is to be hoped that the 1922 figures will show even a more decided tendency in the same direction.

An audited statement of receipts and disbursements for the year 1921, copies of which have been circulated among those present, shows the total cost of running the affairs of the Association amounted to $5,129.18, which figure includes $201.88 for Safety Competition Shields, as compared with $4,964.55 for the year 1920. If the item for Shields is deducted from 1921 statement, then the cost for 1921 and 1920 is practically the same.

New Development in Accident Prevention

Before concluding this report it might be of interest to describe briefly a new development of the Accident Prevention educational campaign. Some time ago it was suggested by one of the Directors of the Association, that it might be a good thing if closer co-operation could be obtained between all the associations organized for the prevention of accidents. Just at that time a re-organization of the Industrial Accident Prevention Association had been concluded. A new Secretary had been appointed, a man of large accident experience, of broad mind, and anxious to help in any way possible to further the cause. The change thus brought about made it easy for your Secretary to approach the Secretary of the Industrial Accident Prevention Association for the purpose of advocating close co-operation among all the Safety Associations. As a result of many conferences a scheme was outlined for mutual support. Meetings were held at which the following organizations were represented: Workmen's Compensation Board; The Department of Labor; Ontario Safety League; Electrican Employers' Association; Industrial Accident Prevention Association; Lumberman's Safety Association; Ontario Pulp & Paper Makers' Safety Association.

Various schemes were suggested to impress on employers and employees the necessity for greater effort in the prevention of accidents. One suggestion especially received the unanimous support of all representatives, viz.: the holding of a joint Safety Convention in Toronto under the auspices of all the associations interested. Sub-committees were immediately appointed to make the necessary arrangements. These arrangements were completed and one of the largest Safety Conventions ever held in Toronto was convened on April 4th and 5th. A very attractive programme was arranged.

HAWES PAPER CO. INCORPORATES

Articles of the incorporation have been secured from the State of Pennsylvania for the incorporation of the Hawes Paper Company which succeeds the Paper Products Manufacturing Company. This concern until a few months ago was located at 21st and Arch streets, Philadelphia, but at that time much larger quarters were taken at Oxford and Hancock streets. Ned Hawes, who is widely known in the trade is secretary and treasurer of the company, with M. E. Hawes as president and K. B. Hawes as vice-president. The Hawes Company is the Philadelphia agents for Wachenheim Company of New York, the American distributors for Cellophane, the famous French papers of Fenestra line used in the manufacturing of boxes. The territory to be covered by the Philadelphia agents includes Pennsylvania, Maryland and Delaware. E. S. Birne representing the New York house visited the trade during the week.

ST. MAURICE PAPER COMPANY

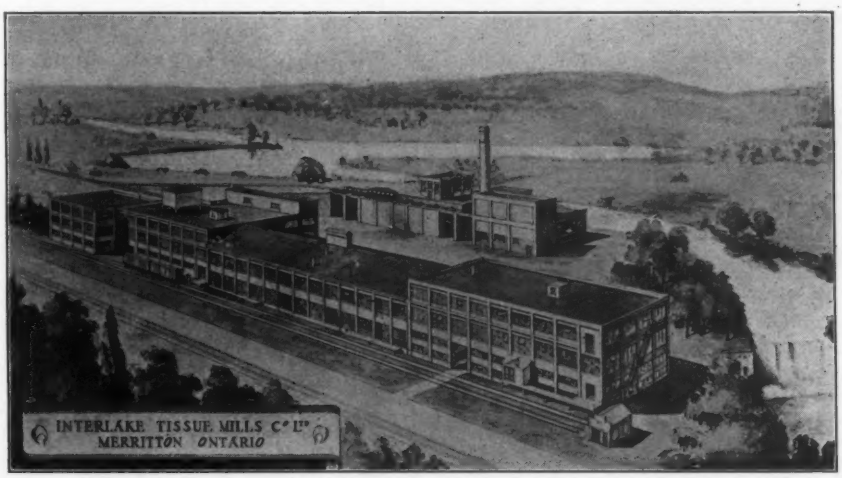
In the annual statement of the St. Maurice Paper Company, Cape Madeleine, Que., now in the hands of shareholders, is reflected a marked reversal in the business of the company, which for 1920 produced one of the most satisfactory exhibits which came out in the spring of 1921. Total profits for the year were $1,046,679 as compared with $2,976,636 the previous year. Net profits before provision for Government taxes were $706,729 as compared with $1,813,341 the previous year after taxes, the latter figure representing an earning of 22.68 per cent. on the capital stock.

INTERLAKE TISSUE MILLS CO. ADDS NEW MACHINE

Written Especially for the Annual Number of the Paper Trade Journal by G. W. Brock.

One of the most successfully managed and progressive institutions in the pulp and paper industry in Canada is the Interlake Tissue Mills Company, Limited, whose headquarters are in Toronto, with mills located at Merritton in the Niagara Peninsula of Ontario. The company was organized in 1911 by George Carruthers, who is the president of the company. I. H. Weldon, of Toronto, is the vice-president and treasurer and S. F. Duncan, of Toronto, is secretary.

The manufacture of tissue and toilet papers, towels, napkins, light weight wrappings and various toilet and tissue specialties was begun in 1913 and, with one machine since that period, the plant has been increased from time to time. During the past year, owing to the extensive growth, a second machine was installed and put in operation, nearly trebling the capacity of the mill. New beater and stock rooms and boiler plant were erected and a story on the finishing department was added. The buildings are all of steel concrete, brick and glass and represent the last word in efficiency and completeness.



PLANT OF THE INTERLAKE TISSUE MILLS CO., LTD.

Features of Unusual Interest

There are several features about the plant which are worthy of more than passing notice. The gravity plan has been adopted in construction, which means that everything needed in operation and manufacture comes from a higher to a lower level as required in the various processes of papermaking. For instance, the pulp is delivered on the third floor of the mill, being brought in on a high level by the railways. The same arrangement applies to the coal supply. The cars come right in over the bunkers into which the black diamonds are directly dumped, and from the bunkers are run through chutes to the mechanical stokers in the boiler room. Thus all materials are handled with the minimum expenditure of time and labor, which results in a very economic operation of the plant.

The Interlake Tissue Mills Company, Limited, has its own plumbing, wood and machine shops, which enables all repairs and overhauling of equipment to be carried out on the premises. The company has also its own printing department and all other accessories. In excellence of lay-out and design the mill is not surpassed in compactness and convenience in the various departments and no expense has been spared in obtaining perfection in lighting, heating, ventilation and fire protection.

Equipment of the Plant

No. 1 machine is a Yankee Fourdrinier with a 106-inch trim and a capacity of five to ten tons a day, varying according to the weight of the paper turned out. No. 2 machine which is now in successful operation, is a 148-inch Fourdrinier, with 136-inch trim and a capacity of 20 to 25 tons a day, making paper of the weight of 10 pounds up to 90. It was built and installed by the Dominion Engineering Works of Montreal, and is equipped with 18 dryers, each of 48-inch diameter, two presses, a Millspaugh suction roll, one stack of calenders and Edwards attachment.

It is driven by the Harland electric, sectional drive with interlocking control which was installed by the Harland Engineering Company, of Manchester, Eng. and Montreal. Some features of this drive are the fine adjustment of draws and the minimum of power consumption. It is possible to gauge how each section of the machine is functioning, when in operation, by means of electric indicators. The various sections of the machine may, by electric buttons, be started or cut out and the control also enables any portion of the equipment which is not working satisfactorily, to be stopped at a moment's notice or speeded up as required. Although the capacity of the plant today is nearly three times what it was at the beginning of last year, the mill was operated during 1921 to within 20 per cent of the maximum, which is a remarkable record considering the trying times through which the paper industry has come during the period of readjustment.

The other equipment of the plant includes two, 800 pound beaters; one, 1,500 pound double roll Marks beater; five, 1,500 Noble Wood beaters and four Jordans. The mill has its own special filtration plant, which ensures a pure supply of water at all times. Electric power is obtained from Niagara Falls and part of the equipment is driven by steam. The Interlake

Company possesses splendid shipping facilities, both on the Grand Trunk railway and on the Niagara, St. Catharines and Toronto line and has its own electric switch.

Product of the Plant

The output consists of a full range of white and colored M. G. and M. F. tissues, white and colored light M. G. wrapping, French folios, onion skins, dry proofing, paper towels, paper napkins, decorative crepe rolls, outing sets, fruit wraps and other specialties. Among the most unique productions are the Travelers' Sanitary Package, Children's Hygienic Bibs, Luncheon Sets, etc. The company also supplies the Interlake Towel Cabinet, which delivers one tissue towel at a time and holds a package of 150 towels. The cabinet is of metal finished in dull olive green which harmonizes with any woodwork or wall finish.

George Carruthers at the Head

The Interlake Tissue Mills Company has always believed in publicity and has proved its aggressiveness in many other ways. For several years it has maintained an exceptionally attractive booth in the Manufacturers' building at the Canadian National Exhibition, Toronto, which is the largest fair held annually in the world. The sides of the booth are festooned with decorative crepe tissue, panelled in white rope tissue and, among the inviting effects are flowers created of colored tissue that are so natural in appearance as to lead thousands of visitors to believe that they are recent cuttings from a greenhouse rather than the product of a Canadian paper plant.

The president and general manager of the company, George Carruthers, has always taken a keen interest in the activities of the Canadian Pulp and Paper Association, and more particularly in the Technical Section and Safety Movement. He is president of the Ontario Pulp and Paper Makers' Safety Association and chairman of the International Committee on Text Books, which is directing the publication of valuable manuals for the use of workers and apprentices in the pulp and paper mills of Canada and the United States. Mr. Carruthers has always been deeply concerned in educational matters and is a strong advocate of apprenticeship in the mills. In centres where no technical school advantages are afforded, the committee of which he is the head, is doing everything, both practical and possible, to increase the efficiency and earning power of those who are making their living in pulp and papermaking. Mr. Carruthers is also a member of the Advisory Board of the Canadian National Institute for the Blind. He spent his early youth on his father's farm and then went to the United States where he served an apprenticeship as a machinist and left a position as general foreman of a large machine shop to go with the International Correspondence Schools as organizer, and later superintendent of agencies, which position he held until he entered the paper manufacturing industry.

CENTRAL OHIO PAPER CO. FIFTY YEARS OLD

The Central Ohio Paper Company of Columbus, Ohio, is this year celebrating its fiftieth anniversary.

Like most business concerns that have achieved success, the company had a small beginning. It was established at 21 West Broad street, Columbus, Ohio, in 1872, by Thomas D. Hubbard under the name "Central Ohio Paper House"—Columbus at that time having a population of 35,000, while now it has eight times that, or 280,000.

In 1875 Orlando A. Miller came into the business as bookkeeper, and soon became a large factor in the business. In 1877 he began building the selling policy of the concern outside, and continued traveling until 1880, when he was admitted to partnership and became the active manager. In 1883 the building at 33-39 South Wall street was erected and the business was carried on there under the name "Central Ohio Paper House," by Hubbard & Miller until March, 1887, when Mr. Miller bought Mr. Hubbard's interest and incorporated The Central Ohio Paper Company with $20,000 capital paid in. All that had gone before was building a foundation and from this time growth was rapid and steady—the first year showing an increase of fifty-eight per cent.

One remarkable thing about this company has been its unchanging personnel. Of the original officers—O. A. Miller, president, F. E. Miller, vice-president and K. D. Wood, secretary, remain—the other two directors, the late J. H. Friend of Dayton, vice-president and the late F. Holford of Springfield, were succeeded by Albert M. Miller, vice-president and T. C. Morris, completing the present directorate.

While the capital has been built up from $20,000 to $1,550,000 common stock, not a dollar of the same has ever been sold outside the original group, excepting $50,000 of new stock sold to employees.

The management has always taken a keen interest in the welfare of its employees, in furtherance of which the "Copco Family Death Benefit Plan" was put into effect by creating a fund from which the sum of $1,000 is paid upon the death of any employee or officer of the company having been on the payroll for one year. All sharing alike, without any cost or obligation other than service to the company. There are now 254 employees subject to the benefits of this plan.

To provide for the continuous growth of the business and necessary storage with track facilities, the building at 43 Vine street and Big Four Railroad was built in 1890, but even this, together with the Wall street building, proved inadequate and in 1897 the company abandoned Wall street and built, at 70-80 East Gay street, what was then the largest and best building in the paper trade. To this was added the fine fireproof building at 197-199 E. Gay street in 1910 as an annex, but the business continued to grow and to overcome the inconvenience of three warehouses the management conceived the idea of one great building to house all and were fortunate in securing a site in the heart of the city, 150 x 200 feet on railroad at 226 North Fifth street, where in 1916 the company built its permanent home which is recognized as a model in office appointments and arrangement for handling paper, as well as being the largest individual building devoted to the sale of paper in the United States.

The company believes in good buildings and has built the same type of fireproof buildings in Toledo (1916) and Cleveland (1918). These, with the Columbus House, make a group unequaled in the paper trade. Still to care for future growth the company has bought 275 feet additional land on the railroad immediately north of its present Columbus building. This assures ample room to expand for at least another fifty years there and it also has bought 200 feet of land on the railroad in Toledo. Plans for building on this site are maturing and will be executed as soon as conditions permit.

The Hendrick Manufacturing Company of Carbondale, Pa., makers of perforated metals, announces that the address of its Pittsburgh office will be changed from 915 Union Bank Building to 544 Union Arcade Building.

NEW SPALDING MILL AT TONAWANDA, N. Y., COMPLETED

The J. Spaulding & Sons Company started construction early last year on a paper mill for the manufacture of rag paper used in its present vulcanized hard fiber plant at Tonawanda, N. Y.

The new paper mill adjoins the fiber plant and is constructed along strictly modern lines of concrete, brick and steel. The contract for the general construction work was entrusted to the Lackawanna Bridge Company of Buffalo, N. Y.

The new mill consists of a one story storage building for rags in bales,—a five story building entirely fire proof, for the rag dusting, sorting, cutting and boiling departments,—a one story and basement building for the washing, beating and refining equipment, —a one story machine building, large enough for two paper machines, only one of which is now being installed,—a one story building of exceptionally large capacity for the storage of finished paper, —and a one story power house consisting of two separate rooms for the steam boiler and steam electric power equipment.

The rag preparing department has four large rotary bleach boilers supplied by Walsh's Holyoke Steam Boiler Works, rag dusters supplied by the Moore & White Company and rag cutters by the Taylor Stiles Company.

In the paper making department there are fourteen washing and beating engines supplied by J. H. Horne & Sons Company, who also supplied the Fourdrinier paper machine.

Stuff chests and agitators were supplied by the Union Machine Company and screens by the Sandy Hill Iron and Brass Works.

The steam plant has Heine Boilers equipped with Frederick stokers. The chimney was built by the Custodis Chimney Construction Company.

An unusual feature for a mill of this kind is the complete and up-to-date coal and ash handling and storage equipment supplied by the R. H. Beaumont Company.

The entire mill, excepting only the variable speed part of the paper machine, is electrically driven with equipment supplied by the General Electric Company.

The mill has been designed throughout with a view to future enlargement, the power plant and paper machine room as now constructed are large enough for more than double the present capacity and the other structures are built to permit of readily adding to them for future extensions.

A complete fire protection system with yard hydrants and interior sprinklers was installed by the H. G. Vogel Company. This system is supplied from an elevated fire tank on steel tower erected by the Chicago Bridge and Iron Works.

The paper machine and storage rooms are equipped with a hot air heating and ventilating system designed for vapor absorption and moisture elimination. The equipment being supplied by the J. O. Ross Engineering Corporation.

The water supply for the mill is taken from the Niagara River about a mile from the plant. A pump house at the river bank and a pipe line connecting with the mill, both installed as part of the new paper mill, deliver the water to a filter plant in the mill, supplied by the Norwood Engineering Company.

The entire plant was designed and supervised by George F. Hardy, Engineer, New York, and is now about ready to be placed in operation.

TEMISKAMING PULP CO. ALMOST READY

The new ground wood mill of the Temiskaming Pulp and Paper Company, which will be located at Haileybury, Ont., on the shore of Lake Temiskaming, will be ready for operation early in the summer. The capacity of the first installation will be 40 tons per 24 hours, and in accordance with the present plan, the product will be for the open market.

The company owns timber limits on the Quinze River, and as it is tributary to Lake Temiskaming, easy water transportation for the pulpwood is afforded. Provision has also been made for handling settlers' wood by rail by means of a siding from the Temiskaming and Northern Ontario Raliway.

Arrangements have been made to secure power for operating the mill from the Northern Ontario Light and Power Company which supplies the territory between Cobalt and Kirkland Lake. The probability of future extension has influenced to a large degree the design of the mill as well as the type of apparatus selected.

NEW PLANT OF THE TEMISKAMING PULP AND PAPER CO., HAILEYBURY, ONT.

IMPROVEMENTS BY CHERRY RIVER PAPER CO.

During the past year the management of the Cherry River Paper Company, with pulp and paper mills at Richwood, W. Va., has adopted a program of plant improvement that promises to place its operation and its products among the first in the class of manufacturers producing high-grade, all-sulphite manilla, white and colored fiber papers, boxboard, manilla tags, kraft wrappers, and specialties.

Limited steam capacity from its boiler plant, shortage of electrical power to meet the increasing demands for paper, water supply of varying quality, and certain buildings of old construction and crowded condition have placed serious limitations on the quality and quantity of this company's product.

In consultation with the engineering firm of Joseph H. Wallace & Co., of New York City, plans are now being prepared and construction work is in progress on improvements which will completely modernize this plant.

Boiler House

An entirely new boiler plant is in course of construction. As it was necessary to keep the pulp and paper mill in operation during the period of making improvements, the engineers were obliged to seek a new location for boilers, as surrounding buildings and limited space prevented the rebuilding of old boilers and house, except in the case of the wood refuse burning plant, which will be retained.

The plant is laid out for six units of the Bigelow-Hornsby water tube type of boilers, five of which are now being installed. They are each of 630 h.p. rating and are equipped with Taylor automatic underfeed stokers. Each furnace has seven retorts and it is proposed to operate each boiler at 150 per cent of rating continuously.

The working steam pressure will be 150 pounds per square inch, and Foster superheaters will superheat the steam to 125° Fahr.

An open feed water heater will receive exhaust steam to heat the boiler feed water, and steam turbine driven centrifugal feed pumps will deliver hot water to the boilers.

Coal will be handled mechanically, from the time it is dropped from the railroad cars until it enters the furnaces. For the daily demands, coal is transferred from cars to an overhead bunker of 400 tons capacity, located at one end of the boiler house. From there it is drawn by gravity into a weigh larry, and by it is transported to the stoker magazines. Ashes are dropped from the furnaces into ash hoppers beneath the boilers, and from them drawn into ash cars, which deliver their load to a skip hoist and thence to an overhead ash bunker—to be taken away later in railroad cars.

Provision is made for storing coal in the mill yard up to fourteen thousand tons, when required, by means of a drag scraper conveyor. The R. H. Beaumont Company, of Philadelphia, are making the coal and ash handling installation.

Power Plant

The company's power plant will be increased by the installation of a 1,500 kilowatt Turbo generator, with condenser and switchboard equipment. The installation of this machine permits the electrification of portions of the plant that formerly were driven by steam engines, and a considerable economy in operation is thereby expected to result.

Water Supply

One of the most troublesome problems with which the company has been confronted in the past is that of its water supply. Being situated on a mountain stream, it has been subject to the rapid fluctuations of river stages, caused by sudden and heavy precipitation on the limited water shed back of its property. These sudden rises in the river have brought down large quantities of sand and silt, which have been a source of endless concern to the management.

Stream pollution, cinders and vegetable matter have also had their effect on the quality of finished product.

A new pumping plant, pipe lines, and filters to handle 4,000,000 gallons per day are in the course of construction, and upon the introduction of these changes in the company's operations, a marked improvement in the quality and uniformity of product is to be expected.

Pulp Mill

Reconstruction of portions of the sulphite pulp mill has been made necessary through the obsolescence and decay of the original wooden construction of the screen and wet machine rooms. This type of structure is to be entirely displaced by steel and concrete, and a rearrangement of screening equipment will permit of greatly increased facilities for handling and screening pulp stock, and dewatering that portion which does not go directly to the beaters.

All of these improvements will be completed and put into operation during the coming summer months.

FIGHT TO RESCIND PULPWOOD EMBARGO

Although it is announced in Montreal this week in despatches from New York that the influence of the American publishers is too strong to allow Washington to put an import tax on Canadian pulp, private advices received here are to the effect that American news print manufacturers are determined to keep up the fight to rescind what is called the present "embargo" on the export of pulpwood cut from Crown lands. It is stated that many American manufacturers of news print, who leased limits in Quebec, claim that they have a valid legal right to do as they wish with the wood cut from these limits. As a matter of fact no such legal right exists.

As has been stated before, there is no such thing as an embargo on the export of pulpwood. The limits are leased to individuals or companies irrespective of nationality and those Americans who have leased cutting rights on the Crown lands of the province have, of course, agreed to the conditions of the leases. One of the conditions of these leases is that the pulpwood must be manufactured into pulp before being exported from Canada.

Therefore, if the present tariff bill in Washington give President Harding the right to carry on negotiations with foreign countries in regard to tariff bargaining, and if this is made a weapon for an attempt to force Canada to allow the export of pulpwood from Crown lands, then it will be found that the Federal Government, under the terms of the British North American Act, which allows the provinces the absolute control of their own natural resources, has no power whatever in the matter and it is not for one moment to be thought that the province of Quebec will allow the Dominion Government to exercise any pressure to force it to abrogate any of the conditions of the leases to which those who have secured these leases have specifically agreed.

ST. CROIX PAPER CO. REORGANIZES

The St. Croix Pulp and Paper Company of Hartville, N. S., has been reorganized and will in the future be known as the Premier Power and Pulp Company, with a capitalization of $2,000,000. About $1,000,000 will be invested in renovating the old plant, and, with proposed improvements, it is expected that the output will be about 8,000 tons of news print and 5,000 tons of wrapping paper a year.

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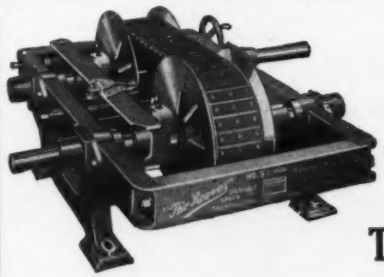


The Reeves

Variable Speed Transmission

If it's a question of getting the exact speed on your Paper Machine to suit the condition of the paper being manufactured, then "THE REEVES" Variable Speed Transmission is exactly what you want.

The following are a few improvements and refinements incorporated in the manufacture of "THE REEVES" Transmission:

TWO KEYS, full length of shaft
LARGER DISCS
LARGER DISC HUBS
PATENT EQUALIZING COLLARS

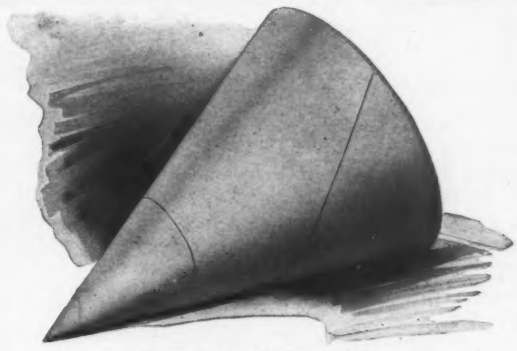
Special high duty Ball Bearings are furnished for the main thrust bearings and the main box bearings if desired.

It is the only Variable Speed device with 25 years' service record.

REEVES PULLEY COMPANY

COLUMBUS, INDIANA

3



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Sanitary Drinking Cup

is used by the hundred million each day in the year to prevent epidemics due to the use of common drinking cups and fountains with uncertain water pressure. Cities with half a million population are already ordering

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although these cups have only recently been placed on the market.

Easy to Sell—Long Profits

Burt's Drinking Cups have attractive long profit margins and twelve exclusive features which make them sell easily:

No wax to taste.
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Fit the hand.
Dispensed without waste
Priced very low.
No bottom to fall out.
Made of fine white paper.
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Hold hot drinks.
Holder furnished if desired.

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Choice Territory Still Open

Packed in Containers of 5,000

which will yield attractive profits at the retail selling price of $2.50 per thousand, with discounts for quantity consumption.

F. N. BURT COMPANY, LTD.

Paper Cup Division **BUFFALO, N. Y.**

PAPER MAKING AT EAST DOWNINGTOWN

The paper industries at East Downingtown, Pa., play not only the dominant part in the industrial life of that thriving community, but through their personnel, are leaders in the civic development. Executives of the S. Austin Bicking Paper Company, the Frank P. Miller Paper Company and the Kerr Paper Company, all located at East Downingtown together with the Downingtown Machinery Company, maker of paper mill machinery, and the Downingtown Paper Box Company and allied industries take active part in the Downingtown business club. This association co-operates with the civic authorities in the protection of the community, the improvement of its lighting, street grading and paving and policing and particularly in the educational development. The clubs' effort at this time being directed especially to the development of vocational training the public schools so that its pupils will be qualified to take active parts in the industrial life of this paper making center.

Specialized Paper Production

The district is intimately connected with specialized paper production which has been going on for many years. Throughout Chester County, contiguous to and indeed in Downingtown itself, are numerous streams assuring an adequate supply of water of fine quality. In the olden days these spring fed streams attracted the notice of manufacturers of straw board, who produced their goods with primitive machinery and carried the boards out on the fields to dry. The district is an agricultural one and straw was plentiful. Since then, in the transmutations of time, paper manufacturing industries have changed from straw board to box boards and to building and lining papers and other products. The region is well supplied with railroad facilities to the markets of Philadelphia, New York and the West and large supplies of paper stock can be transported economically from Philadelphia by freight or even by motor truck.

The Newest Development

The newest development in the East Downingtown region is the manufacture by the Austin Bicking Company of a new line of asphaltum interlined paper. A plant for the coating of paper with hydro lined asphaltum, known as the K-B process and operated under license from the Flint-Kote Company of Boston, is now being constructed and shortly will be ready for production. The asphaltum produced as a cold tar by-product is received at the plant, heated in large retorts, mixed with clay and water into an emulsion and is then pumped through pipes into the machine room, where the paper is coated. The machine can be run without the asphaltum covering or with it, by the mere turn of a valve. Being in an emulsified form, the asphaltum while readily adhering to the paper, has none of the stickiness or oiliness usually associated with it. The hand can be dipped into the emulsified liquor and though it comes out coal black can be washed clean with ordinary water. The new process is to be applied to the 82 inch four cylinder machine. There is also in the plant a 75 inch machine and either or both can be used in the manufacture of rosin sized building indented carpet lining and packing paper, mill wrappers, or box board. The K-B process of water proof papers are to be used as sheathing and building papers, case and car lining and slaters felts. The mills are run by water and steam and they have a capacity of 50 tons a day. The history of the mills dates back to the middle of the 18th Century. John Frederick Bicking, a native of Winterburg, Germany, born in 1730, came to the United States in 1751. He had experience as a paper maker upon his arrival here and he soon established himself in the mill business on Mill Creek, near Philadelphia, where he made paper for the United States Government. S. Austin Bicking, immediate founder of the present firm, descended from John Frederick, through his second son, John Bicking, who was born in 1755 and who established a paper mill at a locality afterwards called Fisherville. His son, Samuel, operated the mill for some time and the son of Samuel, S. Austin Bicking, soon afterwards engaged in the manufacture of binders' boards in a mill owned by his uncle, Richard Bicking and located on Marsh Creek, just north of Downingtown. Afterwards, he entered into a partnership with Samuel Gorland in the manufacture of hanging or wall paper. From there he moved to Downingtown in 1880, establishing a binder board mill and a few years afterwards converting it into the present mills. The officers of the present concern are Joseph A. Bicking, president, Edwin Bicking, vice-president and Frank S. Bicking, secretary and treasurer.

The Frank P. Miller Paper Co.

Not far removed from the Bicking mill are those of the Frank P. Miller Paper Company, two mills which were fortunate enough to enjoy a 100 per cent production throughout last year and which have continued up to that mark thus far in 1922. They produce box board. The founder of these mills recently withdrew his interests in them and the mills are being conducted by J. Gibson McIlvain, Jr., president, Hugh McIlvain, vice-president, and Frank Parke, secretary and treasurer who takes the place of Mr. Bicking. They have a daily capacity for 15 tons and produce boards for both stiff and folding boxes and some grades used in textile machinery. Close by the Miller plant is that of the Downingtown Paper Box Company. A half a mile away is the plant of the Kerr Paper Company, which has a productive capacity, operating exclusively on the manufacture of binder boards, but which recently has not been very active. The plant has a very complete machine room equipment and takes care of virtually all its own repairs as well as the production of machinery and improvements facilitating board manufacture.

NEW HOME FOR ZELLERBACH CO.

Excavation work is under way for the new three-story, concrete, thoroughly modern new home of the Zellerbach Paper Company at Sixth and Franklin streets, Oakland, Cal.

The Zellerbach Company at present occupies a building adjoining the site of its new offices and work room.

According to J. Clem Ady, local manager of the big paper company, the new building will be one of the finest of its kind in Oakland. It will have a large basement in addition to the three stories above ground and will be equipped with an extensive tube system permitting quick communication between departments and exchange of commodities handled by the firm. Elevators will connect the three walls.

Altogether the new Zellerbach Building will be a credit to the firm and to the city.

JOHN R. BOOTH STILL ACTIVE AT 95

John R. Booth, veteran lumber king of Ottawa, Ont., was 95 years of age the past week, having been born April 5, 1827. He was born at Waterloo, Quebec, and went to Ottawa at the age of 30, and has resided there continuously for 65 years. Mr. Booth is in excellent health still despite his great age. Members of Mr. Booth's family, when asked as to how he would spend his 95th birthday, stated that he would drive to the mills, as he does every day, make his usual inspections, and possibly receive the congratulations of members of the office and mill staffs.

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This Registered Trade Mark Octagon

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ESTABLISHED 1878 AT HOLYOKE, MASS.

Makers of Highest Grade Fourdrinier Wires, Dandy Rolls, Cylinder Covers, Brass Wire Cloth of all Meshes for Paper, Pulp and Coating Mills—Quality Guaranteed

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If you judge felt values, not by what you put into the equipment, but what you get out of it—then you will specify ORR 3 stripe Endless Felts, for ORR felts will produce the lowest cost per ton. They "stand up" under severe usage. Orr durability is acknowledged everywhere. Their strength and long life are as dependable as their reliability and quality.

In the 32 grades of Felts and Jackets we can match your most exacting demands. Tell us the kind of paper you desire to make, and we will send you samples of felts that will economically serve you and help you to produce paper at lowest cost per ton.

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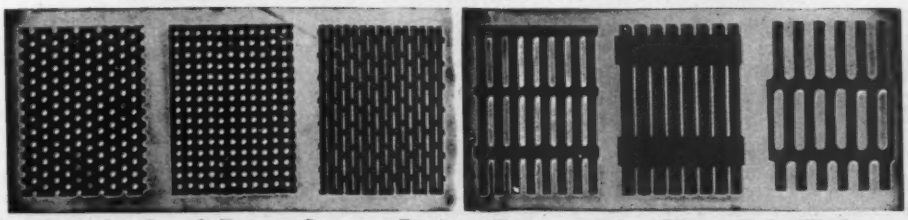
PERFORATED METALS

All sizes and shapes of Holes



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MACHINE TENDERS, Rodgers Wet Machine. Married man preferred, also Digester Cooks. Address, Box 4938, care Paper Trade Journal. A-13

WANTED—Sales Agency for Pacific Coast Territory representing manufacturer of fine or Coarse Paper, Tissue, Waxed, or Paper Specialties, Distributing to Dealers or Consumers. Personal interview can be arranged immediately. Address, Box 4942, care Paper Trade Journal. A-13

SALESMAN WANTED—Familiar with Toilet Paper Market. Good salary to one who can produce results. State experience and salary expected by letter. Address, Sauquoit Toilet Paper Co., New Hartford, N. Y. A-20

SALESMAN WANTED by large mill for their Eastern Office. Must be experienced in selling high grade Cardboard, Coated and Plain; also Blanks, Tag and Postcard. Must have personality and thorough acquaintance among the Eastern Paper Jobbers and Converters. Correspondence strictly confidential; state full experience and compensation expected. Address, Box 4973, care Paper Trade Journal. A-13

WANTED—Beater Engineer, 90" Fourdrinier making Book. State experience, age, etc. Mill located near New York City. Address, Box 4974, care Paper Trade Journal. A-13

PAPER SALESMAN—Experienced, for New York and vicinity for a well known house. Handling Printing Papers. Salary and commission. Good proposition for the right man. Correspondence strictly confidential. Address, Box 4975, care Paper Trade Journal. A-13

SPECIALTY MILL wants superintendent with good conception of business, ability to develop ideas, and who is tactful and competent in handling help. A man familiar with cylinder and fourdrinier machines preferred. Applicant must state length of time in present position, experience fully, salary now receiving, and any other information that would be of interest to prospective employer. Address, Box 4976, care Paper Trade Journal. tf

WANTED—Machine tender and beater man for small cylinder machine in Massachusetts, running on light board and specialties. Steady, married men, over thirty-five. Address, Box 5000, care Paper Trade Journal. A-13

SALESMAN—Paper and Cardboard jobbing house in New York City has opening for an experienced man with following among printers, publishers and lithographers. Commission basis, drawing account. State full particulars in confidence. Address, Box 5001, care Paper Trade Journal. A-13

PAPER SACKS—Experienced adjuster on Smith and Winchester, Complete Sacks machines. Address, Box 5006, care Paper Trade Journal. A-13

PAPER SALESMAN

Old Established Firm selling Coarse Papers to Jobbers and Converters seeking high grade man knowing thoroughly New York Trade. State age, experience, remuneration expected. Strictly confidential. Address, Box 4995, care Paper Trade Journal. A-13

HELP WANTED

WANTED—Experienced man who understands colors, to operate creping machines on tissues. Give your age, references, married or single and all details in first letter. Excellent opportunity for capable man. Address, Box 4992, care Paper Trade Journal. A-13

WANTED—Experienced superintendent for paper bag manufacturing plant making square, flat, automatic, millinery bags, etc. Must be thoroughly competent to supervise all mechanical details, handling help, and get maximum production consistent with first class product. Must have all details of experience, salary expected, etc., in first letter. Address, Box 4993, care Paper Trade Journal. A-27

WANTED—Resident representative who is familiar with Paper and Pulp Mill supplies in New England territory, preferably Boston or Holyoke. Must be well introduced. Also for Pennsylvania territory at Philadelphia, and Middle Western territory at either Dayton or Cincinnati, as well as at Kalamazoo, Chicago, and Neenah or Appleton. Old established New York House. Address, Box 4994, care Paper Trade Journal. A-20

BY-MILL AT MOBILE, ALABAMA—Making chipboard, a first class machine tender. Steady work. Address, Gulf Paper Company, Inc., P. O. Box 97, Crichton, Mobile, Alabama. A-13

WANTED—Reliable machine tender, running tissues on cylinder machine. A good job for the right man. Apply Empire Paper Co., Ithaca, New York. M-4

SITUATIONS WANTED

PAPER SALESMAN in New York City who can produce a large volume of business with adequate co-operation, desires connection. Drawing account on Commission basis. Correspondence invited. Address, Box 4635, care Paper Trade Journal. tf

WANTED POSITION—As superintendent. Twenty-one years' experience; used to Specialties, Colors and Wrapping, all grades of Boards and Fibres. Knows how to handle help. Can keep up repairs. Used to Fourdrinier and Cylinder Machines. Address, Box 4786, care Paper Trade Journal. tf

WANTED—Position as Day or Night Ground Wood Superintendent. United States or Canada, by young man. Married man, twelve years' experience on all grades. Now employed. References. Address, Box 4943, care Paper Trade Journal. A-13

SUPERINTENDENT, now employed, desires to make change. Varied experience on all grades of box boards, container, etc. Best of references from past and present employers. Address, Box 4949, care Paper Trade Journal. A-13

WANTED: WOOD PULP

To the wood pulp dealer or importer. If you are looking for efficient sales representation, this advertisement should not fail to interest you. A man, thirty-eight years of age, of recognized ability in sales circles and a splendid acquaintaince with paper mill trade, is open for sales connection handling broad line all grades wood pulp. Will consider salary or commission offer that guarantees steady traveling east and west. If you have responsible pulp conections, let me hear from you. All communications strictly confidential Address, Box 4930, care Paper Trade Journal. A-30.

SITUATIONS WANTED

SUPERINTENDENT — Wants position, Ledger, Bonds, Writing, colored specialties, hanging. Practical. Can make your mill pay. Go anywhere. Best references. Address, Box 4888, care Paper Trade Journal. A-13

FIFTEEN YEARS' diversified experience in the paper industry and naturally equipped with knowledge of paper such as would be an asset to your organization. Young man, 32 years of age, married, desires connection with mill or reputable jobber. Address, Box 4971, care Paper Trade Journal. A-13

EXECUTIVE with managerial ability, trained office manager, accountant and cost expert. Student of Walton School of Accountancy, Alexander Hamilton Institute and Industrial Extension Institute; specially experienced in paper mill administrative problems, financial, cost and efficiency installations, seeks position of trust and responsibility. Highest references given. Address, E. J. B., P. O. Box 760, Cincinnati, O. A-13

DOES YOUR MILL pay? If not, why not have a superintendent with proven ability and experience that will make it pay? Address, Box 4977, care Paper Trade Journal. Je-2

MAN WITH EXECUTIVE ABILITY desires position as Mill Manager. Years of experience in Paper Manufacturing. Expert in Sales, Purchasing, Cost, Accounting and Office supervision. Address, Box 4978, care Paper Trade Journal. A-20

SUPERINTENDENT open for position. Life experience, practical on cylinder, Fourdrinier, Yankee Bonds, Book, Waxing, Coating and Specialties. All grades of Boards, Straw, Fibres, Kraft. 7 years foreign experience, India and Japan. Middle aged. Will go anywhere. Address, Box 4979, care Paper Trade Journal. A-13

EXPERIENCED MECHANICAL ENGINEER seeks new connection Paper or Pulp mill. Capable and with record of maintenance at low cost. Familiar with foreign Mills operations. Best references. Address, Box 4981, care Paper Trade Journal. A-13

COLLEGE MAN, Gentile, with twelve years' sales and executive experience in the marketing of fine papers, card board and specialties in Philadelphia territory, is seeking new connection. Thoroughly acquainted with printers, publishers, box makers and other consumers in this territory and their various needs. Address, P. O. Box 978, Philadelphia, Pa. A-13

EXPERIENCED BOSS BEATERMAN. Up-to-date man accustomed to nearly all grades, wants to make change after May 15, 1922. Address Box 5002, care Paper Trade Journal. A-27

POSITION WANTED as Machine Tender, experienced on Harper Edwards, cylinder with Halley Fuller Attachments on all high grade tissues. Address, Box 5003, care Paper Trade Journal. A-13

MILL CONNECTION DESIRED

Successful and Well Established Selling Organization, with offices centrally located in New York City, familiar with trade in City and adjoining territory, wishes mill connections on wrappings, newsprint and other papers. Strictly commission basis. Address, Box 4998, care Paper Trade Journal. A-20

SITUATIONS WANTED

SUPERINTENDENT of ability open for position with good company making box board, container board, wall board, bristol board or straw. A man that understands a plant thoroughly and gets good results. Address, Box 4997, care Paper Trade Journal. M-4

BOSS FINISHER wants position—Thoroughly experienced finisher. All grades of Fourdrinier and Cylinder Papers. Competent and reliable. Highest references. Address, Box 5004, care Paper Trade Journal. A-27

SUPERINTENDENT open for position. Good man on Book, Bond, Wrapping. Colored Specialties, Grease Proof and Glassine Papers, also Tissue. Can give good results. References. Address, Box 5005, care Paper Trade Journal. A-13

POSITION WANTED by practical paper maker as superintendent, or will accept position as night boss in box board mill where production, quality and economy is required. Address, Box 4984, care Paper Trade Journal. A-20

WANTED POSITION—Was Plant Manager in News mill. Experienced in both manufacturing and accounting departments. Experience includes operation of Pulp and Paper Mill and general maintenance of plant. Address, Box 4985, care Paper Trade Journal. A-13

SUPERINTENDENT - MANAGER Wants position. Twenty years' experience on all grades paper. Expert on colors. Fourdrinier and cylinder machines. Best references. Address, Box 4988, care Paper Trade Journal. MA-18

SUPERINTENDENT, General Foreman, or responsible office position, Envelope and Specialty Manufacturing, 18 years' practical experience, all branches. Familiar with costs and up-keep. Married, 38 years of age. Would like position. A-1 reference. Address, Box 4990, care Paper Trade Journal. A-13

FOR SALE

FOR SALE: DRYERS—8-60"x120" Dryers with bearings. A bargain. W. V. Sullivan, Call Bldg., San Francisco. tf

FOR SALE—Paper machine reel 110" Face. Heavy pattern revolving reel for 4 drums. Marinette & Menominee Paper Co., Marinette, Wisconsin. tf

FOR SALE—Roofing and Saturating Machines, 72"x36" wide. Chilled steel rolls. Also Painter Mixing Machine, Grinders, etc. Address Box 4310, care Paper Trade Journal. tf

FOR SALE— 14 Calendar Rolls, 58" face, 3' 14" diameter. 2 No. 1 Claflin Engines. 1 small Jordan Engine. 1 6" Horizontal Water Pump. 2 Air Fans. Complete triple-deck frames for 44 Dryers. Will arrange terms to suit. Chesapeake Paper Board Co., Baltimore, Maryland. tf

FOR SALE

Box Board Mill, nearly new. Central New York State. Plenty land for expansion. Siding, water rights, small water power possibilities. All equipment first class. Well situated for raw materials and near a box making center.

Will consider sale outright or capital from responsible and experienced man. Address, Box 4955, care Paper Trade Journal. tf

MISCELLANEOUS

WANTED—8 plate open Packer Screen with or without plates. State lowest cash price. Mill Department, Rose Lithographic Corporation, 55-33rd Street, Brooklyn, New York. A-27

WANTED—A single Drum Winder suitable for Winding Tissue, about 72 inch face. Address, Box 4948, care Paper Trade Journal. A-13

FOR SALE

FOR SALE—10,000 cords of 4-foot peeled spruce wood for delivery first three months 1923. Price and shipping point on application. Address, Box 4996, care Paper Trade Journal. A-13

FOR SALE—One five-gallon International Electric Glue Pot, only used two weeks, in excellent condition. Address, Wortendyke Manufacturing Co., Richmond, Va. A-13

FOR SALE—Three Howard Refiners, in A-1 condition. Address, Box 4999, care Paper Trade Journal. A-27

COAL—Moshannon and "E Seam" bituminous coals, low sulphur, low ash. Lowest freight rate east and north. Prices and freight rates will be furnished on request. Halden-Kelley Coal Company, 209 Market St., Clearfield, Pa. tf

FOR SALE

One New York Safety 5" x 8" vertical steam engine, 32" x 4½" fly wheel, Pickering Governor.

One bank of 13 dryers 28" diameter, 80" face, set in two tiers, complete with top and bottom felt stretcher guides, and carrying rolls in first-class condition, with steam headers. Now in use.

One two drum reel for 84" machine complete, now in use.

One 10 plate, Harmon screen, complete with plates, driving pulley and three extra sets of plates.

One Pope Mullen screen, 10 plates, 12" x 42".

One 36" Holyoke Machine plater.

One 6" x 16" Holyoke Machine, horizontal, single plunger, belt driven, water pump.

Address, Box 4989, care Paper Trade Journal. A-27

FOR SALE

We own two and one-half acres of land improved with two-story brick building, 4,500 feet of floor space, plenty of trackage, water and electricity for manufacturing of any kind.

Will sell for less than building cost. or we will sell or lease small binders board mill ready to go, or will consider joining with capital sufficient to install box mill in conjunction, or might consider leasing board mill to capable mill men on profit sharing basis. For particulars, address, J. S. Settle, 100 Broadway, Denver, Colorado. A-13

MISCELLANEOUS

PULP WANTED—Will pay cash for any quantity Foreign Pulps on spot and to arrive. Send particulars with price. Address, Box 4832, care Paper Trade Journal. tf

SWIFT, GEORGE W., JR., Designer and Manufacturer of Special Machinery for Manufacturing and Printing Paper Goods, Bordentown, N. J. 8-24-22

Treasury Department,
Office of the Secretary,
Washington, D. C., March. 30, 1922.

Sealed proposals will be received at this office until 11 o'clock A. M. Thursday, May 4, 1922, from manufacturers of bond, bank-note and other fine papers for furnishing bank-note paper of the highest quality containing the distinctive feature now in use by the Department, for the printing of United States currency and other securities, national and Federal reserve bank notes, Federal reserve notes, etc., for the fiscal year beginning July 1, 1922. Blank forms for submitting proposals, with specifications and further information, will be furnished manufacturers who intend to bid upon application to this office where samples of the paper required may be examined.

A. W. MELLON,
A-20 Secretary of the Treasury.

Treasury Department,
Bureau of Engraving and Printing,
Washington, D. C., April 3, 1922.

Sealed proposals are invited to furnish this Bureau with Postage Stamp Paper and Internal Revenue Paper, Brass and Iron Castings, Cleaning of Windows, Purchase of Pulp, Ink Scrapings, Distinctive Paper Shredded Trimmings and Postage Stamp and Internal Revenue Paper Trimmings, during the fiscal year beginning July 1, 1922. Proposals to be received not later than 2 P. M., Monday, May 15, 1922. Blank forms with specifications for proposals for the several schedules and further information will be furnished on application to LOUIS A. HILL,
A-13 Director.

Rebuilt Paper Mill Machinery in Stock and Guaranteed

NOT WHERE IS AND AS IS

FOURDRINIER TISSUE MACHINE—One 96", one 68".
FOURDRINIER PARTS—Pusey & Jones 118", 100". Kutter Trowbridge 96".
PRESS PARTS FOR PAPER MACHINES—Pusey & Jones bell crank housing two sets 18"x96", Black & Clawson swing arm housings with rolls.
DRYERS—Four 48"x111", thirteen 36"x95", four 48"x68", one 84"x67", eleven 42"x66".
MARSHALL DRIVES—Two Black & Clawson self-contained stand with friction clutch cone pulley and 6" mortise gears. Mortise gears and pinions for Pusey & Jones Marshall drives 5" to 8" face.
CHILLED CALENDERS—One 66" face, five roll; one 54" face, five roll.
DILLON DOCTORS—For Machine Calenders 60" to 120" face.
SLITTERS AND WINDERS—One 120" Warren, one 118", 36" Kidders.
REELS—Pusey & Jones two drum upright 48" to 114".
BEATERS—Five 72"x42" Noble & Wood, one 66"x42" Noble & Wood, equipped with three cylinder washers; one Dilts 62"x50" iron tub, one Jones 62"x52", seven Horne 36"x36". Two No. 2 Claflins, two No. 1 Claflins.
JORDANS—One Wagg Majestic, three No. 2 Dillon Improved, one Large Horne, four Monarch, one Jones Standard, two Pope Brushing engines.
SCREENS—Six 10 plate open side Packer, two 6 plate, one Moore & White auxiliary.
STUFF PUMPS—Deane triplex, 9"x8", Gould triplex 8"x10", Sandusky triplex 4"x6".
REVOLVING SHEET CUTTERS—One 104" Horne, five 61" Hamblet, four 61" Finlay, one 50" Hamblet diagonal, one 42" Finlay.
WET MACHINES—Four 72" Bagley & Sewall Hydraulic.
SUPER CALENDERS—One 45", one 42", one 36" Holyoke.

We have a large number of pumps and over five hundred calender, press and couch rolls in stock.

FRANK H. DAVIS COMPANY
175 Richdale Ave., Cambridge, 40, Mass.

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LONGITUDINAL AND CROSS DRUM TYPES WASTE-HEAT BOILERS

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BOILER MANUFACTURERS FOR 40 YEARS

BLUE RIDGE FIBRE

Bleached Soda Pulp

Manufactured and sold by

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BUENA VISTA, VIRGINIA

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Don't Use Your Beaters For Rag Cutters

Put in a

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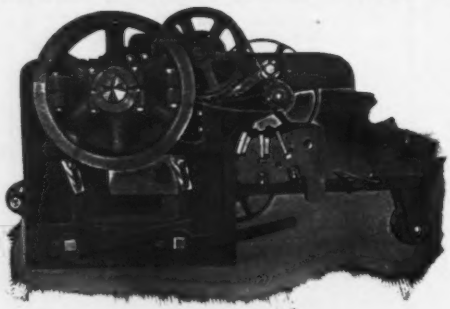
and cut your stock thoroughly and evenly



NO. 11 TRIPLEX

Capacity 2 Tons per hour

Weight 8500 lbs.

For Roofing and Felt Stock

MACHINE KNIVES

TAYLOR, STILES & Co

RIEGELSVILLE, N. J. U.S.A.

STOCK GIANT CUTTERS

Canadian Manufacturers Under Patents: WATEROUS ENGINE WORKS CO., Brantford, Ont., Can.

I. MARX & CO., London, E. C., sole agents for the United Kingdom

THE HUNGARIAN PAPER INDUSTRY IN 1921

The American Vice Consul at Budapest has made the following report to the Department of Commerce regarding the Hungarian paper industry:

Prior to the partition of the country, in accordance with the provisions of the Treaty of Trianon, Hungary was considered one of the foremost paper-producing countries of Europe. Practically the entire paper industry was located in territory lost to Hungary by the peace treaty. Of 32 paper-manufacturing plants that existed in Hungary under the dual Empire, only 2 remain to present Hungary. In this connection it should be noted that about 90 per cent of the forest area is also distributed among the detached territories.

Present Capacity of Paper Mills

Of the two paper-manufacturing plants left in Hungarian territory, the Kolba Mihaly fiai Papirgyara, at Diosgyor, which is the important one, was established about 1700 and is at present a corporation owned and controlled by Michael Kolba & Sons. It is equipped with the best of machinery for the manufacture of a very fine bond paper suitable for high-grade document and bond work and a special brand for the official requirements of the Government. Prior to the war the factory employed about 170 men when working to full capacity, but at present the plant is working at only half the pre-war rate and employs about 70 men. The entire production of 1,760 pounds per month is consumed by the Government. The other plant, A Nagymarosi Papirlemezgyar, at Nagymaros, is very small and employs about 25 men. The production of paper board, which is made entirely from waste paper, amounts to about 6,600 pounds per month.

Before the war the entire paper production of Hungary represented a yearly sum of about 50,000,000 crowns, or $10,000,000, but this was not sufficient to supply the domestic requirements, and a considerable amount was imported from Austria, Bohemia, and Germany.

Chief Sources of Paper Supply

At present every ounce of paper and paper products for Hungarian consumption, other than the bond paper manufactured in the country and used by the Government, must be imported, Austria, Czechoslovakia, Germany, and Rumania being the chief sources of supply. This interesting situation should be noted by American paper manufacturers interested in a market for their goods in Hungary. It should also be observed that a new factory may be established within the near future, basing its supply on the raw materials obtainable from Yugoslavia. It is also stated that experiments are now being made to produce paper pulp from cornstalks, but as yet no valuable results have been attained.

Pre-War Consumption of News Print

The yearly consumption of news print paper prior to the war usually reached a total of approximately 52,800,000 pounds, whereas the present estimated consumption amounts to about 13,200,000 pounds. This large decrease is explained by the fact that all the surrounding countries have prohibited the importation into the detached territories of Hungary of any printed matter in the Hungarian language, and from the further fact that a large number of newspapers and magazines are published in the detached territories. However, negotiations between the various contiguous territories and Hungary will be entered into within the near future in the hope that the present strict regulations governing the importation of Hungarian newspapers and other printed matter will be removed, causing a revival of this trade between the various States. The claim is also made that should Hungarian printed matter be permitted entry into the neighboring countries, the yearly consumption of news print paper would reach an amount equal to about 39,600,000 pounds, all of which must be imported. In connection with this class of paper it might be of interest to remark that the favorable high exchange rate of Czecho-Slovak currency compels Hungarian buyers to get their supplies from Germany.

Drawing Paper—Market for Wall Paper

Prior to 1918 the Hungarian market was supplied with drawing paper by a firm in Fiume. However, since that year the total amount consumed and imported into Hungary is purchased in Germany. The quality of paper now being imported from Germany is inferior to that supplied by the Fiume concern and is sold at very high rates on the German market.

The yearly consumption of wall paper does not appear to be very important, being at present about 44,000 pounds. This is due to the fact that all buildings, renovating, and refurnishing of houses, etc., is at a standstill in Hungary, because house renting is regulated by the State and increased rents are not permitted for the time being. Proprietors are therefore not in a position to remodel or renovate their property at the increased costs. It is believed, however, that after the present restrictions are lifted, even to a slight degree, trade in wall paper will improve.

The entire amount of wall paper imported into Hungary prior to the war was purchased in Germany. The old Austrian and German patterns are reported to be in less demand at this time, and the public is desirous of obtaining entirely new patterns. Therefore new patterns of a quality differing from the German style will undoubtedly gain favor in the Hungarian wall-paper market.

Prices of Paper

The present prevailing prices for paper in Hungary are far below the market prices of the world, for it is reported that the merchants purchased a very large supply at favorable rates several months ago. The following list of prices will illustrate those existing on December 28, 1921:

Kinds of paper		Wholesale	Retail.
		Crowns	Crowns
A-1 sheets, free from wood	per kilo	85	95
A-2 sheets (memo)	per kilo	50	56
Printing	per kilo	40	42
News Print	per kilo	42	44
Wrapping	per kilo	40	50

RECEIVER FOR HINCKLEY FIBRE CO.

Henry R. Beebe of Utica, N. Y., has been appointed by the United States District Court as receiver for the Hinckley Fibre Company, Hinckley, N. Y., and has given a bond in the sum of $75,000 and entered on the discharge of his duties.

The Fibre Company has liabilities of $1,245,000, exclusive of unpaid wages and salaries amounting to $8,000 and accounts of more than $180,000 past due and more than $500,000 of bills and notes past due.

The assets are given as real estate, plant and equipment valued at $880,565.88; timber land and stumpage, $49,764.50, and pulpwood in the yard and advance supplies amounting to $609,372.93, a total of $1,539,703.83.

Although it has large assets, the defendant has exhausted its working capital and has been unable to operate its mill for more than six months past and has no money available to pay the workers necessarily employed when operations are not being carried on, or to pay the ordinary expenses incident to the preservation of the plant from deterioration.

FREDERICK L. SMITH
21 EAST 40TH STREET, NEW YORK
PULP AND PAPER MILL ENGINEER

GEORGE F. DREW
MILL ARCHITECT AND ENGINEER
Consulting and Operating
BRUNSWICK, MAINE
SPECIALTY: Pulp, Paper and Saw Mills
Cotton, woolen, worsted, cordage, silk mills, and their equipment.
Appraisals, adjustments.

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Paper, Pulp and Fibre Mills, Including Building and Complete Mechanical Equipment, Water Power Development, Dams, Storage Reservoirs and Other Hydraulic Structures, Examinations, Reports, Estimates of Cost, Designs, Specifications, Valuations

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FOREST ENGINEERS
527 Fifth Avenue New York, N. Y.

J.H. WALLACE & COMPANY.
TEMPLE COURT BUILDING NEW YORK CITY, U.S.A. CABLES, TRIPLEX, N.Y.
PULP PAPER AND POWER PLANTS
ENGINEERS & CHEMISTS
INDUSTRIAL DESIGN PLANT IMPROVEMENT LABORATORY TESTS

J. O. Ross Engineering Corp.
30 E. 42nd St.
CHICAGO NEW YORK CITY BOSTON
VAPOR ABSORPTION SYSTEMS

ENGINEERS PLANNING POWER TRANSMISSIONS
Secure Data and Estimates of "MORSE" DRIVES
SAVE Construction, Space, Light, Fuel Producing More with Less
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Limited Resources Require Careful Management
Timber Estimates, Reports and Maps Help You
JAMES W. SEWALL
Forest Engineer
OLD TOWN, MAINE MUNSEY BUILDING, WASHINGTON, D. C.
Largest cruising house in America

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Timber and Pulp Wood Estimates.
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Consulting Forester
58 Telegraph Building, Hospital St., Montreal, P. Q.

SLITTERS and SPECIAL MACHINES
for use in paper industry
C. BENNINGHOFEN & SONS
Hamilton, Ohio
Send us your requirements regardless of what they may be

STRATFORD PAPER CO. 160 Cornelison Ave. Jersey City, N. J.
High Grade Fourdrinier Tissues in Stock for Immediate Delivery

Obituary

Benjamin F. Crump, Sr.

Benjamin F. Crump, Sr., treasurer of the Tissue Company, manufacturer of crepe paper products, Saugerties, N. Y., died last week, aged 70 years. Mr. Crump was one of Saugerties best known and best beloved man. He was a man of sterling worth and integrity, a high minded, progressive business man and a citizen of no small ability and usefulness. Mr. Crump was a member of Ulster Lodge, No. 193, F. & A. M., and the executive board of the Chamber of Commerce, and director of the Saugerties Savings and Loan Association. In these organizations he was closely identified with their success and advancement.

From early manhood he was connected with the paper industry of Saugerties, and had been associated with the various mills hereabouts. At the time of his death, he was treasurer and business manager of the Tissue Company.

Mr. Crump possessed a pleasing personality and suave manner and his friends and acquaintances were far and wide.

In the sorrow that has befallen the family, the sympathy of all will be extended for Mr. Crump was highly esteemed and will be sorely missed.

SOME IMPROVEMENT AT BOSTON

BOSTON, Mass., April 12, 1922.—For the first time in many weeks a majority of paper merchants in this city agree that the general tone of business here had improved to a slight degree. Of special significance, however, in connection with this statement is the added fact that the change seems to be permanent.

Naturally there are the dull spots and the pessimists, but on the whole the business is here and those who are out hustling get it. Each month shows a slight improvement over the preceding one. That briefly is the general situation in the Hub.

Printers, stationers engravers, commercial houses, are in the market almost continually for small orders. The volume is great, but the sum total in actual revenue does not amount to any startling sum.

Despite stories that many mills are running less than 50 per cent capacity, comes word from the mills of the Millers Falls Paper Company, Old Deerfield Bond, that the plant is "buzzing" 24 hours every day and the mill is unable to care for all its orders.

Then, too, there seems to be a marked increase in purchase of book papers. The textile strike and various other labor controversies which honeycomb this section has dealt a severe blow to the industry. Also, the "flunk" in the much-hoped-for building campaign. Two large mills making "roofings" this week cut off orders for materials ranging anywhere from 15 to 25 cars a week because they had no assurance of a market. The building program has fallen flat to all appearances. Other branches of the paper stock business are quiet with prices well off.

The board business is fairly good. Brockton, the shoe city, is coming into the market and there is a fair demand from many quarters. Users of candy boxes, however, are doing absolutely nothing, and the cities of Lynn and Haverhill are out of the running altogether so far as orders go, due to labor troubles.

Salesmen in the local field, though, are turning in some fair orders and leaders in the box board business are unanimous that this particular line is improving month by month.

EFFECT OF TARIFF CHANGES IN WRAPPING

It is interesting to note the effect that tariff changes sometimes have on imports of certain commodities. One of the clearest-cut illustrations of the effect of the tariff change is the case of wrapping paper imported from Canada during the period that Section 2 of the Canadian Reciprocity Act of July 26, 1911, was operating. This period, which lasted from July 26, 1911, to October 3, 1913, is the only period during which wrapping paper from Canada has come in duty-free. At the time this act went into effect wrapping paper was dutiable at 35 per cent ad valorem and pratically none was imported from Canada. The kind of wrapping paper given free entrance by the Canadian Reciprocity Act was paper valued at not more than four cents per pound, which included the greater part of the imports. After Section 2 of the Canadian Reciprocity Act went into effect imports of wrapping paper from Canada increased rapidly. The following table shows by quarters the value of our free imports of wrapping paper for consumption from Canada during the entire free period:

July 26, 1911, to Sept. 30, 1911	.....
October 1, 1911, to December 31, 1911	.....
January 1, 1912, to March 31, 1912	.....
April 1, 1912, to June 30, 1912	$1,214
July 1, 1912, to September 30, 1912	1,632
October 1, 1912, to December 31, 1912	21,609
January 1, 1913, to March 31, 1913	62,902
April 1, 1913, to June 30, 1913	118,903
[1]July 1, 1913, to October 3, 1913	366,757

It will be noted that some months went by before imports began but that after once getting under way they increased rapidly. The figure for the period from July 1 to October 3, 1913, namely, $366,757, also includes imports of free wrapping paper from other countries during the period July 28 to October 3, 1913, on account of the fact that by court construction of existing most-favored-nation treaties the privilege of free entry of wrapping paper valued at not more than four cents per pound was extended to certain European countries. There is no doubt, however, that imports from Canada for that quarter increased over the previous quarter. During the three or four years following the imposition of a general 25 per cent duty on October 4, 1913, imports of wrapping paper from Canada steadily declined. Here then is an instance of a rapid increase of imports of a commodity following the placing of that commodity on the free list and the gradual decrease of imports of that commodity following the reimposition of the duty.

[1]Includes also imports of free wrapping paper from other countries between July 28, 1913, and October 3, 1913.

BIDS AND AWARDS FOR PAPER

The purchasing office of the Government Printing Office will open bids on April 14 for the following paper:

72,000 lbs. (2,000 reams) 21x32 36 No. 20 white glazed bond paper.

36,000 lbs. (21,000 sheets) 26x20 No. 30 binder's board, No. 2 quality.

8,100 lbs. (100 reams) 32x48—81 white S. and S. C. printing paper.

The Old Dominion Paper Company has been awarded the contract by the purchasing officer of the Government Printing Office for furnishing 1,400 lbs. of 22½x28½—280 white railroad board at $0.094 per lb., bids for which were opened on March 29.

The R. P. Andrews Paper Company has been awarded the contract by the purchasing officer of the Government Printing Office for furnishing 13,000 lbs. of binder's board of various sizes at $.047 per lb., bids for which were opened on March 10. The same firm will also furnish 80 sheets of 18½x22¾" bristol board at $.46, bids for which were opened on March 22. The Maurice O'Meara Company will furnish 8,000 lbs. of 22½x28½" manila cardboard at $.057 per lb., bids for which were opened on March 29.

The following bids were received at the printing office for 150,000 cartons 3¾x5⅝": Knickerbocker Supply Company, $6.38 per thousand, $6.84 per thousand, and $7.28 per thousand; A. George Schulz Company, $6.30; R. P. Andrews Paper Company, $9.13; National Folding Box Company, $6.55; Ohio Boxboard Company, $6.72; Stone & Forsyth Company, $8; The Rochester Folding Box Company, $8.15; Lord Baltimore Press, $6.05; Climax Manufacturing Company, $6.16; Whitaker Paper Company, $9.17.

THE
MANAGEMENT ENGINEERING AND DEVELOPMENT CO.
7TH FLOOR CITY NATIONAL BANK BLDG.,
DAYTON, OHIO.

DESIGN, CONSTRUCTION AND OPERATION
OF
PULP, PAPER AND FIBRE MILLS
WATERPOWER DEVELOPMENT
STEAM POWER PLANTS.

PLANS AND SPECIFICATIONS
EVALUATIONS AND REPORTS
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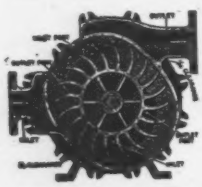
STEBBINS ENGINEERING & MFG. CO.
Mill Architects Watertown, N. Y.
Sulphite and Soda Mill Equipment
Specialty: ACID SYSTEMS, DIGESTER AND ACID PROOF LININGS GUARANTEED.
Service department always ready for emergencies. Only high class experienced men employed.



EFFICIENT SUCTION ROLL OPERATION demands the NASH HYTOR
THE NASH ENGINEERING CO.
SOUTH NORWALK, CONN.

UNITED STATES TESTING COMPANY, Inc.
316 Hudson Street CHEMISTS New York City
Microscopical Examination, Physical Tests and Chemical Analysis of Paper. Official Chemists to the American Paper and Pulp Association, Association of American Woodpulp Importers, etc.
We analyze Fuels, Chemicals, Dyestuffs, Intermediates, Gasoline, Oils, Paints, Soaps, Greases, Waxes, Water for Drinking or Boiler Purposes, Woodpulp, etc.

E. BUTTERWORTH & CO., Inc.
CHARLES H. WOOD, Pres. *LEWIS JENNINGS, Treas.*
Boston Office, 136 Federal St. New York Office, 1123 Broadway
PAPER MAKERS' SUPPLIES
Agents for "S" Brand and Snow Brand Bleached Sulphite Pulp

Your Card in This Space Will Bring Results
Rates on application

"Ask Your Neighbor What He Thinks of Them."

67 JENSSEN
Two-Tower Acid Systems now in operation or building.
Normal Prices Today Govern Our Installations
Every second Sulphite Mill on this continent is using our Towers and Making Money by Making Better Acid.
G. D. Jenssen Company
200 5th Ave. New York, N. Y.

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Charles W. Bell
Consulting Specialist
In the Manufacture of PAPER BOX BOARD, TEST BOARD, FIBRE BOARD AND STRAWBOARD
And their fabrication into SHIPPING CONTAINERS, (Corrugated and Solid Fibre) FOLDING BOXES, etc.
Forty years' practical experience in all departments—Equipment, processes, formulae, trade customs, management, order and planning system. Markets, sales, estimating, prices, contracts, materials, supplies, collections, arbitrations, receivership and valuations.
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BELLE ALKALI COMPANY, Belle, W. Va.
PURE CHLORINE In cylinders and tanks
BLEACH BELLE BRAND
CAUSTIC SODA 76%—Solid and Flake
Arnold Hoffman & Co. Inc., Sole Agents, PROVIDENCE BOSTON NEW YORK PHILADELPHIA CHARLOTTE

Paper Stock
NOW IS THE TIME TO BUY OUR RAW MATERIALS
Out of our forty different grades of paper stock you are assured a steady, reliable source for procuring raw materials in practically every branch of paper making. Having specialized for 35 years in this one field you can depend upon a clean, well-packed, uniform product throughout; fulfillment of delivery promises; and because of our output of 300 tons daily, big tonnage at all times. Write us your wants.
Mendelson Bros. Paper Stock Co., General Offices: 910 So. Michigan Ave., Chicago, Ill. Long Distance Phones, Harrison 2240 and 5557

HOME OF S. WALTER & CO., INC.

The largest warehouse building and store in Philadelphia devoted solely to the coarse paper business came into existence since the last annual convention of the American Pulp and Paper Trade Association, and it places the capstone of success on the activity of probably the most widely acquainted individual in the coarse paper business.

This important accession to the ranks of paper trade structures is the home of S. Walter & Co., Inc., 144-146 North Sixth street, the firm bearing the name of one of the few city fathers who still exists under the new Philadelphia charter. While under the old charter of the city there were almost three-quarters of a hundred of councilmen, common and select, serving without pay, there are now but a score of city fathers, each drawing $5,000 annually, and

WAREHOUSE OF S. WALTER & CO., INC.

Mr. Walter is one of them. With the restriction in number, the dignities, importance and influence of the members of this governing body increased very decidedly and this gives the president of the S. Walter Company a position of great prominence.

Mr. Walter had been engaged in the industry almost his entire business life, establishing himself in business back in 1905, after considerable acquaintanceship with it as an employee. In that year he opened a small office at 109 South Sixth street, but the next year found a warehouse necessary, and this was secured at 116 North Third street. Business expanded, and in 1912 the firm took larger quarters at 321 Cherry street, remaining there until the middle of last year when the firm, by this time an incorporated organization, took title to the large six-story building on Fifth street, with a frontage on Quarry street and another on Reese street, in the rear, giving it exceptional facilities for the handling of paper in quantities.

The new home was thoroughly renovated and in part reconstructed, new elevators were installed, shipping platforms erected, well appointed offices arranged and every facility developed for the expeditious handling of large as well as small volume business. The house deals in the whole coarse paper line, especially featuring colored papers, and also does an extensive business in toilets, towels and bags. It is the exclusive Philadelphia distributor for the Mothex Garment storage bag and for several lines of colored wrapping papers.

Under the incorporation, Simon Walter is president, Thomas F. Kennedy, vice-president, and Harry Lefkowitch, treasurer. While business engages the close attention of Mr. Walter, his activities, of course, are by no means confined to it, or to his duties as a municipal legislators. He takes an active interest in social and philanthropic affairs, being a member of the Mercantile Club, the Philmont Country Club, the Linwood Country Club of Atlantic City, the Federation of Jewish Charities and the Jewish Seaside Home. Mr. Kennedy, the vice-president, is also very widely known in paper circles, having been for many years, prior to entering the Walter firm, associated with the selling organizations of the D. L. Ward Company, the Garrett-Buchanan Company, and other leading distributors. Mr. Lefkowitch entered the firm's employ as a stenographer and was advanced.

F. C. CLARK MADE VICE-PRES. OF PEJEPSCOT CO.

BRUNSWICK, Me., April 3, 1922.—Announcement is made by the Pejepscot Paper Company of the retirement of William W. Nearing, who for 33 years has been actively connected with the management of the company's paper and pulp mills at Topsham, Pejepscot and Lisbon Falls.

Mr. Nearing tendered his resignation as vice-president and general manager at the annual meeting of the company, which was accepted. He has been succeeded by F. C. Clark, who comes to Brunswick from the mills of the American Writing Paper Company at Holyoke, Mass., and has been elected to the two positions vacated by Mr. Nearing.

GRAY & CREECH OPEN PAPER HOUSE

The firm of Gray & Creech has been established at Winston-Salem, N. C., to engage in the jobbing and brokerage of coarse paper, bags and twine. The principles, S. Wilson Gray, who has been identified with the tobacco trade in Salem for upwards of 20 years, and J. E. Creech, a member of the Dunbar & Sewell Company, Atlanta, Ga., are well known throughout the territory, and by reason of their very considerable following and many years of selling experience are expected to forge ahead in the undertaking without difficulty.

SET-UP DIV. OF CARTON CLUB MEETS

The Set-Up Division of the Carton Club of Chicago, representing Chicago paper box manufacturers of the stiff box variety, held a meeting at the Lumber Exchange, Chicago, on the evening of Wednesday, April 12, with chairman, Harry A. Zorn presiding. Several matters of interest to the paper box manufacturers locally were taken up for discussion. This is the first meeting since the annual election of officers last month, when Mr. Zorn was elected vice-president of the club and chairman of the Set-Up Division.

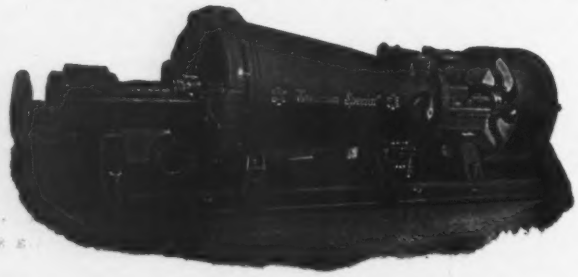
O. H. RUNYAN GOES WITH WHITAKER CO.

O. H. Runyan, formerly identified with Bradner-Smith & Co., 175 West Monroe street, Chicago, on April 1, severed connections with that firm, after being with them for about ten years, and is now sales manager for the Whitaker Paper Company, 216 North Sangamon street. When Mr. Runyan left Bradner-Smith he was manager of sales covering territory surrounding Chicago. In his new connection he has charge of both city and country territory.

HAMMOND PAPER & BAG CO. TO START SOON

Work will be started soon in the plant of the T. H. Hammond Paper and Bag Company in Wellsburg, W. Va., which will cost $300,000. T. H. Hammond of Wellsburg is head of the company. The major portion of the capital is understood to have been furnished by Wheeling business men.

EMERSON MANUFACTURING CO. LAWRENCE MASS.



See the Second-Hand Machinery ads and note the ABSENCE of

EMERSON BEATING ENGINES

They seldom wear out and are never thrown out. PERFECT CIRCULATION. NO "PADDLING."

The "EMERSON" JORDAN

does its work with half the power required by others of no greater capacity.

WRITE FOR DETAILS

WE specialize in durable Fourdrinier Wires and Cylinder Wires in any metal desired up to and including 120 mesh in plain woven, double warp, triple chain, and twisted weaves.

Save two-thirds the cost and three-quarters of the expense of putting on brass and bronze wires by using our nickel alloy wires.

Joseph O'Neill Wire Works

Port Chester, N. Y.

Established 1906

F. L. Smithe Machine Co. Inc.

MANUFACTURERS OF

ENVELOPE MACHINERY

for making any style envelope, regular or special. Printed, stamp embossed and tissue lined envelopes.

Also die presses, tension machines, and metal clasp machines, and all other machinery used in manufacturenvelopes.

Designing, pattern making and machine work.

150 Eleventh Avenue, New York City, New York, U. S. A.

Use Felt Rolls—That have Tight Journals

with solid shaft thru solid wood.
Many other excellent designs.

We pay ½ freight charges, crediting to next order.

RODNEY HUNT MACHINE CO.

63 Maple St. ORANGE, MASS.

Perforated Metal Screens

For Pulp and Paper Mills

.065 Inch Round

STEEL, COPPER, BRASS, BRONZE and other Alloys

punched for Centrifugal and Rotary Screens, Pulp Washers, Drainer Bottoms, Filter Plates, etc.

⅛ x ½ Inch Slots

CHARLES MUNDT & SONS

53-65 FAIRMONT AVE. JERSEY CITY, N. J.

WILLIAM A. HARDY & SONS COMPANY, Fitchburg, Mass., U.S.A.

I. P. CO. NET LOSS AFTER CHARGES $7,442,890

The International Paper Company has issued its report for the year ended December 31, 1921, showing net income loss of $7,442,890 after charges, depreciation, and inventory adjustment. This compares with net income of $12,055,902, equivalent after preferred dividends to $53.17 a share earned on the $19,850,264 outstanding common stock in the previous year.

Consolidated income and profit and loss account for the year 1921 compares as follows:

	1921	1920	1919	1918
Total rev.	$1,542,642	$21,936,236	$7,833,274	$8,194,885
Depreciat'n ...	2,379,967	2,267,713	2,238,433	1,556,786
Invent adj. ...	6,276,607	.....	.....	.....
Fed. tax, etc....	.....	7,265,280	908,166	1,100,000
Bond int., etc..	328,958	347,340	367,380	385,521
Net loss	$7,442,890	*12,055,903	*$4,319,295	*$5,152,578
Pfd. divs.	1,500,000	1,500,000	1,500,000	1,500,000
Deficit	$8,942,890	†10,555,903	†$2,819,295	†$3,652,578
Prev. surp. ...	32,818,070	22,262,167	19,442,872	15,790,294
P. & L. sur..	$23,875,180	$32,818,070	$22,262,167	$19,442,872

*Income. †Surplus.

and subsidiary companies as of December 31, 1921, compares as and subsidiary companies as of December 31, 1921, compares as follows:

Assets

	1921	1920	1919	1918
Plant & properties ..	$53,643,665	$47,729,477	$43,326,136	$44,533,418
Woodlands ...	8,487,773	9,333,796	7,588,739	7,951,899
Securities	3,609,429	3,647,443	4,088,716	5,041,407
Cash	1,137,399	2,057,932	2,740,832	1,449,840
Notes rec.....	256,243	913,169	434,465	945,800
Accts. rec.....	3,082,307	8,865,179	5,808,277	5,909,795
*Inventories ..	30,782,154	25,311,515	23,199,327	20,637,522
Sinkg. fund....	51,140	53,002	131,710	820
Def. assets....	819,881	479,438	466,716	383,133
Total	$101,869,991	$98,390,951	$87,784,918	$86,853,634

Liabilities

Pref. stock.....	$24,889,288	$24,825,308	$24,771,240	$24,724,676
Com. stock....	19,905,104	19,850,264	19,803,920	19,764,008
Funded debt...	7,171,000	6,314,000	6,882,000	7,189,000
Subsid. bonds...	.....	337,500	99,500	789,000
Accts payable..	2,546,611	1,653,048	1,426,159	1,378,279
Notes pay.....	16,039,578	1,595,918	8,600,000	9,565,000
Dividend	375,000	375,000	375,000	375,000
Accrued bond int.....	1,250	1,458	1,658	11,713
Tax reserve....	.....	7,015,280	908,166	1,323,915
Res for payment of def divds.	264,918	418,013	547,390	658,811
Ins. & conting. res.	6,802,062	3,187,093	2,107,718	1,631,360
Surplus	23,875,180	32,818,069	22,262,167	19,442,872
Total	101,869,991	$98,390,951	$87,784,918	$86,853,634

The Standard Bag and Paper Company has moved into its new warehouse at 205 West Philadelphia street, York, Pa.

AMERICAN WRITING RUNNING 80 PER CENT

Mills of American Writing Paper Company, are operating at about 80 per cent, compared with slightly less than 60 per cent at the beginning of the year. While incoming business is improving only slowly, officials are looking for a larger volume of orders which should be governed to a large extent by the general industrial situation.

In contrast to the deficit in 1921, company is now making a small profit above bond interest. Publication of the annual report covering 1921 operations has been delayed owing to appraisal of properties which is being made. It should be ready within a week. It will show a loss after bond interest and inventory depreciation of close to $1,500,000. Inventories have been written down to bed rock and company entered this year in good shape to take advantage of business which may develop.

Report will show the company in easy financial position with excess current assets of approximately $7,000,000 at the beginning of the year. Since then there has been slight improvement and at present it has more than enough liquid capital to take care of business this year.

Decline of inventories in 1921 has not been without its compensations. It enabled the company to make contracts for raw materials which may show a good profit this year on the finished product with trend of prices upward.

BAGLEY & SEWALL GET MACHINE ORDERS

The Bagley & Sewall Company, Watertown, N. Y., announces the closing last week of two contracts for two 164 inches 1,000 foot high speed special news machines upon which work will be started at once. This assures full capacity operations for the big local plant for at least six months, for the orders will be delivered within from six to eight months.

One order is from the Washington Pulp and Paper Corporation with mills located at Port Angeles on the Olympian Peninsula in the State of Washington and was a part of the fruits of the trip west made by Harry C. Kinne of the local concern. The plant now operates one 164 inch machine and has a capacity of 120,000 pounds of news print paper a day. This will double the capacity of the mill.

The other order is from the Kalamazoo Vegetable Parchment Company of Kalamazoo, Mich., and is for the same special machine making a sheet 164 inches wide at high speed. The mills of this company already have three parchment machines and six waxing machines.

The two orders give a special impetus to activities at the local plant and seem to assure continued full time operations.

It has just been announced at the plant that a reduction of about 10 per cent on all wages and salaries has been made effective and that full time operation has been re-established.

WISCONSIN TO SAVE ON COAL RATES

The Wisconsin railroad commission saved hundreds of dollars for Fox river valley paper mills dependent on railroads for their coal supply when it ordered a readjustment of coal freight rates effective April 28. Heretofore the freight rate on soft coal from Green Bay, 30 miles distant, was the same as from Milwaukee and Sheboygan, 100 and 70 miles away. The rate commission adjusted the rates on a mileage basis so that coal now may be shipped by rail from Green Bay for $1 a ton, a saving of 35 cents. The new rate from Sheboygan is $1.40 a ton and from Milwaukee, $1.60 a ton. Under the old tariff the rate from all the points was $1.35 a ton. Wisconsin Rapids and Stevens Point which receive coal from Green Bay also will be benefited by the new rates.

SUPERIOR CHEMICAL CO.

JOLIET, ILLINOIS

Manufacturers

PAPER MAKERS' and FILTER

ALUM

The

"DAYTON" Bandless Beater Roll

(Lock Block Method)

For

Beating Engines of All Makes

WILL SAVE YOU

MONEY TROUBLE EXPENSE

COMPLETE DETAILS ON REQUEST

Dayton Beater & Hoist Co.

Dayton, Ohio

Patented { June 24, 1913. August 10, 1915

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Patented

AUTOMATIC TUBE MACHINE

Wire Stitched Tube

TOILET PAPER MACHINERY

GRISSINGER MACHINE WORKS

PHILADELPHIA, PA.

ALUM

FOR THE PAPER MAKER

Manufactured by

The Jarecki Chemical Co.

QUALITY SERVICE

Sole Selling Agents

ISAAC WINKLER & BRO.

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FOR

Writing, Book and Tissue Papers

PARSONS

Pulp and Lumber Co.

EDWIN J. DEWEY, Manager Pulp Sales

Offices, 1807-1810 Finance Bldg., PHILADELPHIA, PA.

Mills at PARSONS, WEST VA.

"DRAPER" FELTS

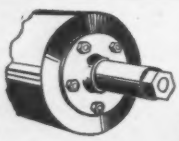
For Any Grade of Paper or Pulp

ARE GUARANTEED

To Give Entire Satisfaction

MANUFACTURED BY

DRAPER BROS. CO., CANTON, MASS.



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Using a

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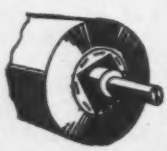

Send roll sizes and let us help you get better results.

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Papier-Zeitung

BERLIN SW 11 (GERMANY)

Founded by Carl Hofman, 1876

appears three times a week

Covers the whole paper trade (paper making, transforming, stationery). More than 12,500 bonafide subscribers all over the world.

Subscription: 4 Dollars

New York Market Review

OFFICE OF THE PAPER TRADE JOURNAL,
WEDNESDAY, April 12, 1922.

The New York paper market is unquestionably in a better condition than at any time since the depression. Improvement is slow and steady and will continue throughout the summer months so that the arrival of fall will find business on a more stable basis than could be anticipated a short while ago. General economic conditions cannot reach the peak of perfection until the export trade is revived and little hope is held out for a satisfactory termination of a campaign to that end for some few years to come, but nevertheless the wheels of domestic industry are turning and even gaining in speed where only lately they were completely motionless, indicating advancement in all trade quarters. The bold front which the paper trade has presented to the many discouragements of the last year has at last prevailed and the industry is again forging ahead. A panoramic view of the entire field still reveals some weak spots and in only a few instances can paper interests begin immediately to take their normal profits, but on the whole the practice of dealing in red figures is at an end and optimism is again in the ascendency. No more boom times are promised for some years but a conservative and steady prosperity, is most assuredly at hand. Credit facilities are considerably better and the rise of Liberty Bonds to par indicates a marked loosening of money. The very active competition now in existence is operating to cause the most efficient work possible in production and selling and in the end is going to cut away a great amount of dead wood and leave the industry far better equipped to carry on and far more experienced in ways of economy. Talking and thinking better business is at last showing results and no one questions that the general feeling throughout the trade is far better.

The news print market is active and staging a recovery from the severe blows dealt it by foreign competition during the late months. Manufacturers are increasing their output to supply the greatest demand that has ever been met. More news print was consumed during last December, January and February than ever before in those months and no cause is apparent for any decrease in the demand throughout the summer. The news print mills have suffered losses for upward of a year by reason of the enforced cut in production and the low prices necessitated. Increased production enables them to meet their overhead, and while profits will have to remain small for a time clear sailing is ahead. Less and less is being heard from German news print and the domestic market is much firmer than when subject to its desultory effect a short time ago.

Although the book paper market is not careening ahead there is noticeable advancement. The bookpaper mills can handle much more business but are operating better on the whole. Orders arrive with some regularity for small lots and most of the demand is of the hand to mouth variety. Salesmen are finding that real work is required to bring home business whereas during boom times it was only necessary to sit back in an office and await results. The price list is steady and not scheduled to fluctuate a great deal for some time except under the influence of seasonal changes.

Fine paper is moving better but the market is still rather sluggish. Good weeks and bad weeks are reported and reveal a spotty condition of things in general. A good deal of effort is being expended in the creation of new lines and novelties which are in better demand than much of the regular line. The cheaper grades of sulphite bonds are the best sellers and bid fair to remain popular until the dollar represents more than it does today.

Tissue is more or less a drug on the market and moving very slowly. The advance in activity staged in January and February could not hold and the present stage of listlessness was more or less expected since production was pushed heavily during those months. The demand for No. 1 white is best but spasmodic. Business can be transacted if dealers are willing to cut prices but for the most part they are standing firm and holding out against losses whenever possible.

The activity of kraft shows little change with the demand holding steady and in sufficient volume to cause maximum production and good feeling throughout the length and breadth of the department. The product of some of the large mills is spoken for several weeks in advance thus placing kraft in a stronger position than many other papers whose mills are still laboring at reduced capacity. Prices are firm and little revision is expected.

Board is still at the bottom of the heap but feeling the general improvement. It is reported that some of the mills are running better and orders are being received in a more encouraging volume. Folding boxboard is most active and the increase in its demand is indicative of an awakening in the merchandising field which should have a positive effect upon the business. Prices are fairly steady and will probably fall slightly when more active production is made possible.

Mechanical Pulp

Supplies of ground wood pulp are accumulating at the grinding plants and no scarcity is looked for since high water will permit of active grinding through May and June. The consuming demand is not stocking up but only asking for a sufficient tonnage to barely keep it supplied. Prices are a bit unsteady and shading is indulged in when sufficient pressure is brought to bear.

Chemical Pulp

The demand for chemical pulp is in fair volume but irregular. Freight rates are an important factor in the situation and tend to isolate points that are not close at hand. Foreign sulphite is available in considerable volume and at prices that cause domestic producers some worry. The size of orders continues small, and there is little effort to lay in large tonnage, in spite of the fact that confidence is slowly returning to buyers. Improvement is looked for and few price changes are anticipated until fall.

Old Rope and Bagging

There is only a moderate demand for old rope and bagging and dealers on the whole are rather discouraged at the long continued hand-to-mouth demand and the small profits that accrue therefrom. Inquiries are forthcoming in goodly volume and indicate that interest is awakening which should be capitalized in the near future.

Waste Paper

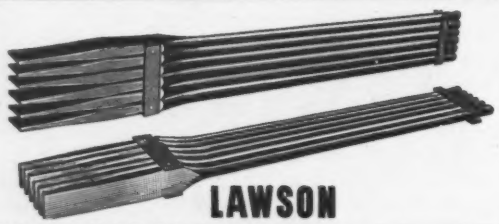
The waste paper market is weak with the exception of a few grades for which there is a limited supply or for which there is an active foreign demand. Very little over issue news is on the domestic market and in spite of the slack demand it is fairly firm. A considerable effort is made regularly to force dealers to quote lower prices, but on the whole they stand their ground and by so doing make for a much steadier condition of things. Quotations as they are just barely cover cost of collecting and packing and downward revision is hardly practical.

Rags

The rag market is slow and spotty. Prices have a habit of changing over night and dealers are at a loss to understand the comparative lack of interest that exists. Paper of high rag content is not selling readily and until general conditions are better no great improvement is expected.

Twine

Twine is selling fairly well and both dealers and manufacturers are encouraged at the advance in activity and general interest. The condition of the market is far better than at this time last year and improvement is still the rule.



LAWSON
ROCK MAPLE BEATER PADDLES
Illustration shows packed one-half dozen for shipping.
MENASHA WOOD SPLIT PULLEY CO.
Menasha, Wisconsin
PAPER MILL SUPPLIES FOR 36 YEARS 1

The Union Sulphur Company
Producers of the Highest Grade
Brimstone on the Market . .
ABSOLUTELY FREE FROM ARSENIC OR SELENIUM
The Largest Sulphur Mine in the World
CALCASIEU PARISH, LOUISIANA
Main Offices: Frasch Building, 33 Rector Street, New York

For reliable running and average long life
Lindsay Fourdrinier Wires
ARE UNSURPASSED
We make them for the largest and fastest machines.
Cylinder Wires all sizes.
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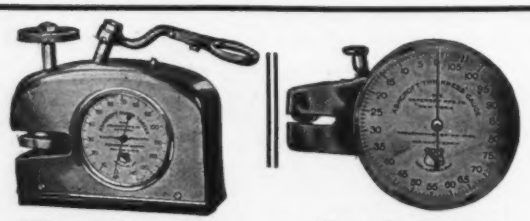
COLLINWOOD STA. CLEVELAND, OHIO

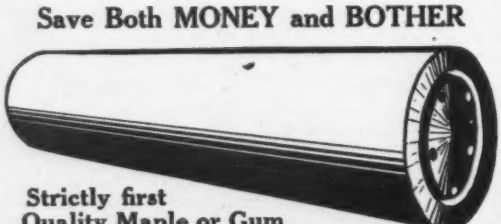
VACUUM TANK
With Four Heads
For Sulphite Mills
We build these Tanks with any number of Heads and in any Size. Your Requirements for all Wood Tanks can be supplied to your satisfaction.
Permit us to estimate on them.
G. WOOLFORD WOOD TANK MFG. CO.
LINCOLN BLDG. PHILADELPHIA, PENN.
When you think of Wood Tanks Think Woolford Tanks.

FOREIGN and DOMESTIC
CASTLE, GOTTHEIL & OVERTON
Paper Stock
New Cuttings
and Rags
Jute Stock
Sizing, Sulphite
and Soda Pulps
200 FIFTH AVE. NEW YORK



The Ashcroft Paper Tester **The Ashcroft Thickness Gauge**
Actual necessities for all those who make, sell or purchase paper in any form. The thousands in daily use testify to their efficiency.
THE ASHCROFT MFG. CO.
119 West 40th Street New York 29 North Jefferson Street Chicago, Ill. 10 High Street Boston, Mass.
Canadian Sales Agents: The Canadian Fairbanks Morse Co., Montreal and Toronto.

Save Both MONEY and BOTHER



Strictly first
Quality Maple or Gum
For Press Rolls, ready for bolting
on heads.
RODNEY HUNT MACHINE CO.
63 Maple St. ORANGE, MASS.

PAPER TWINE
of every description
For use in electrical conduits, cables and furniture, wool or fleece, twine, seaming cord, marking twines and all special paper twines or yarns for knitting, weaving or other manufacturing purposes in plain or printed white or colored.
NATIONAL PATENT REED SALES CO.
1096 Drexel Bldg. Philadelphia, Pa.

Market Quotations

Paper Company Securities

New York Stock Exchange closing quotations April 11, 1922:

STOCKS.	BID.	ASKED.
American Writing Paper Company, pref.	31	33
International Paper Company, com.	47½	48
International Paper Company, pref., stamped	67¾	68
Union Bag & Paper Corporation	62	63½

Because of the unusual conditions prevailing in the various markets quotations are more or less nominal.

Paper

F. o. b. Mill.

Ledgers	10.50	@	30.00
Bonds	8.50	@	55.00
Writings—			
Extra Superfine	14	@	25
Superfine	13	@	20
Tub Sized	10	@	16
Engine Sized	9.00	@	15.00
News—f. o. b. Mill—			
Rolls, contract	3.50	@	—
Rolls, transit	3.50	@	3.75
Sheets	4.00	@	
Side Runs	3.25	@	3.50
Book, Cased—f. o. b. Mill			
S. & S. C.	6.70	@	7.50
M. F.	6.00	@	7.25
Coated and Enamel	8.00	@	10.00
Lithograph	8.00	@	10.00
Tissues—f. o. b. Mill			
White, No. 1	.75	@	.80
Colored	1.00	@	2.00
Anti-Tarnish	.75	@	.80
Silver Tissue	1.50	@	2.70
Manila	.75	@	.80
Kraft—f. o. b. Mill—			
No. 1 Domestic	7.00	@	7.25
No. 2 Domestic	5.75	@	6.50
Imported	5.75	@	6.00
Screenings	2.50	@	3.50
Manila—			
No. 1 Jute	8.50	@	9.00
No. 2 Jute	7.75	@	8.50
No. 1 Wood	4.50	@	5.50
No. 2 Wood	4.00	@	4.50
Butchers	4.25	@	4.75
Fiber Papers—			
No. 1 Fiber	6.00	@	6.25
No. 2 Fiber	5.25	@	5.50
Common Bogus	1.75	@	2.25
Card Middies	4.00	@	5.00
Boards—per ton—			
News	37.50	@	45.00
Straw	40.00	@	45.00
Chip	36.50	@	40.00
Binders' Board	60.00	@	70.00
Sgl. Mla. Lt.Chip	57.50	@	65.00
Wood Pulp	75.00	@	90.00
Container	65.00	@	70.00
Wax Paper—			
Self Sealing White 28 and 30 lb. basis	10.00	@	11.00
Waxed Tissue,	1.40	@	1.60
Glassine—			
Bleached, basis 25 lbs.	12.75	@	13.25
Bleached, basis 20 lbs.	13.75	@	15.25

Mechanical Pulp

(Ex-Dock.)

No. 1 Imported	34.00	@	36.00
(F. o. b. Pulp Mills.)			
No. 1 Domestic	29.00	@	31.00

Chemical Pulp

(Ex-Dock, Atlantic Ports.)

Sulphite (Imported)—			
Bleached	4.25	@	5.00
Easy Bleaching	3.00	@	3.25
No. 1 Strong unbleached	2.75	@	3.00
No. 2 Strong unbleached	2.50	@	2.75
No. 1 Kraft	2.75	@	3.00
Sulphate—			
Bleached	4.00	@	4.25
(F. o. b. Pulp Mill.)			
Sulphite (Domestic)—			
Bleached	4.15	@	5.00
Strong unbl'ched	2.50	@	3.00
Easy Bleaching Sulphite	2.50	@	3.25
News Sulphite	2.25	@	2.75
Mitscherlich	3.25	@	3.50
Kraft (Domestic)	2.50	@	3.00
Soda Bleached	3.75	@	4.00

Domestic Rags

New Prices to Mill, f. o. b. N. Y.

Shirt Cuttings—			
New White, No.1	9.75	@	10.00
New White, No. 2	6.00	@	6.50
Silesias, No. 1	6.00	@	6.50
New Unbleached	8.50	@	9.00
Washables	3.25	@	3.50
Fancy	4.50	@	5.00
Cottons—according to Grades—			
Blue Overall	5.75	@	6.00
New Blue	4.00	@	4.50
New Black Soft	3.25	@	3.50
New Light Seconds	2.75	@	3.00
O. D. Khaki Cuttings	3.25	@	3.50
Men's Corduroy	2.50	@	2.75
New Canvas	6.50	@	7.00
New Black Mixed	2.75	@	3.25
Old White, No. 1—			
Repacked	5.75		nominal
Miscellaneous	4.50		nominal
White No. 2—			
Repacked	3.00		nominal
Miscellaneous	2.25		nominal
St. Soiled White	1.50		nominal
Thirds and Blues—			
Repacked	1.50		nominal
Miscellaneous	1.10		nominal
Black stockings	2.15		nominal
Cloth Strippings	1.05		nominal
No. 1	1.10		nominal
No. 2	.90		nominal
No. 3	.70		nominal
No. 4	.70		nominal
No. 5A	.90		nominal

Foreign Rags

New Light Silesias	6.00	nominal
Light Flannelettes	6.75	nominal
Unbl'chd Cottons	7.50	nominal
New White Cuttings	9.50	nominal
New Light Oxfords	6.00	nominal
New Light Prints	4.50	nominal
New Mixed Cuttings		nominal
New Dark Cuttings	1.90	@ 2.10
No. 1 White Linens	9.50	@11.00
No. 2 White Linens	6.50	nominal
No. 3 White Linens	5.00	nominal
No. 4 White Linens	3.50	nominal
Old Extra Light Prints	2.25	nominal
Ord. Light Prints	1.75	nominal
Med. Light Prints	1.50	nominal
Dutch Blue Cottons	2.10	nominal
German Blue Cottons	1.65	nominal
Ger. Blue Linens	3.50	nominal
Checks and Blues	1.50	nominal
Dark Cottons	1.10	nominal
Shoppery	.95	@ 1.00
French Blues	2.00	nominal

Bagging

Prices to Mill f. o. b. N. Y.

Gunny No. 1—			
Foreign	.75	@	.80
Domestic	.75	@	.80
Wool, Tares, light	1.20	@	1.30
Wool, Tares, heavy	1.25	@	1.40
Bright Bagging	1.00	@	1.10
No. 1 Scrap	.90	@	1.00
Sound Bagging	.75	@	.85
Manila Rope—			
Foreign	4.50	@	4.75
Domestic	4.75	@	5.00
New Bu Cut	2.00	@	2.15
Hessian Jute Threads—			
Foreign	4 25	@	4.50
Domestic	4.00	@	4.25
Mixed Strings	.90	@	1.00

Twines

Cotton— (F. o. b. Mill)			
No. 1	32	@	34
No. 2	30	@	32
No. 3	26	@	28
India, No. 6 basis—			
Light	17	@	18
Dark	17	@	18
B. C., 18 Basis	38	@	40
A. B. Italian, 18 Basis	50	@	60
Finished Jute—			
Light, 18 basis	25	@	26
Dark, 18 basis	26	@	28
Jute Wrapping, 3-6 Fly—			
No. 1	22	@	23
No. 2	30	@	31
Tube Rope—			
4-ply and larger	14	@	16
Fine Tube Yarn—			
5-ply and larger	18	@	20
4-ply	19	@	21
3-ply	20	@	22
Unfinished India—			
Basis	15	@	16
Paper Makers Twine Balls	12	@	14
Box Twine, 2-3 ply	16	@	17
Jute Rope	12	@	14
Amer. Hemp, 6	32	@	34
Sisal Hay Rope—			
No. 1 Basis	14	@	16
No. 2 Basis	12	@	14
Sisal Lath Yarn—			
No. 1	13	@	14
No. 2	10	@	12
Manila Rope	17	@	18

Old Waste Papers

(F. o. b. New York)

Shavings—			
Hard, White, No. 1	3.75	@	4.00
Hard, White, No. 2	3.00	@	3.25
Soft, White No. 1	3.00	@	3.10
Flat Stock—			
Stitchless	1.50	@	1.60
Over Issue Mag.	1.50	@	1.60
Solid Flat Book	1.40	@	1.50
Crumpled No. 1	1.10	@	1.15
Solid Book Ledger	2.00	@	2.25
Ledger Stock	1.60	@	1.65
No. 1 White News	1.50	@	1.60
New B. B. Chips	.47½	@	.52½
Manilas—			
New Env. Cut	2.75	@	2.90
New Cut No. 1	1.80	@	2.00
Extra No. 1, Old	1.60	@	1.70
Print	.90	@	1.00
Container Board	.70	@	.80
Bogus Wrapper	.55	@	.60
Old Krafts, machine compressed Bales	1.85	@	2.00
News—			
Strictly Overissue	.75	@	.85
Strictly Folded	.60	@	.65
No. 1 Mixed Paper	.50	@	.52½
Common Paper	.35	@	.40

CHICAGO

[FROM OUR REGULAR CORRESPONDENT.]

Paper

F. o. b. Mill.

All Rag Bond	35	@	40
No. 1 Rag Bond	30	@	35
No. 2 Rag Bond	18	@	20
Water Marked Sulphite	10	@	14
Sulphite Bond	9	@	12
Sulphite Ledger	12	@	13
Superfine Writing	18	@	24
No. 1 Fine Writing	14	@	22
No. 2 Fine Writing	12	@	20
No. 3 Fine Writing	8	@	12
No. 1 M. F. Book	6¼	@	7
No. 1 S. & S. C. Book	6¼	@	7½
Coated Book	8½	@	10½
Coated Label	8½	@	10½
News—Rolls, mill	3½	@	4½
News—Sheets, mill	3¾	@	4¾
No. 1 Manila	5½	@	6
No. 1 Fiber	5	@	—
No. 2 Manila	4½	@	—
Butchers' Manila	4	@	—
No. 1 Kraft	7	@	—
No. 2 Kraft	6	@	—
Wood Tag Boards	4	@	—
Screenings	2½	@	—
Boards, per ton—			
Plain Chip	35.00	@	40.00
Solid News	40.00	@	45.00
Manila Lined Chip	45.00	@	52.50
Container Line—			
85 Test	60.00	@	65.00
100 Test	65.00	@	70.00
Binders' Board	75.00	@	—
Solid Wood Pulp	80.00	@	90.00
Straw Board	35.00	@	40.00
Filled Pulp Board	55.00	@	60.00

Old Papers

Shavings—			
No. 1 Hard White	3.00	@	3.25
No. 1 Soft Shav.	2.50	@	2.75
No. 1 Mixed	1.00	@	1.10
No. 2 Mixed	1.00	@	1.10
White Envel. Cuttings	3.25	@	3.50
Ledgers and Writings	1.50	@	1.75
Solid Books	1.25	@	1.50
No. 1 Books, light	.90	@	1.00
Blanks	1.75	@	2.00
Ex. No. 1 Manila	1.90	@	2.00
Manila Envelope Cuttings	2.25	@	2.35
No. 1 Manilas	1.20	@	1.30
Folders News (over issue)	1.00	@	1.10
Old Newspaper	.80	@	.85
Mixed Papers	.70	@	.75
Straw Clippings	.70	@	.75
Binders Clippings	.70	@	.75
Kraft	1.75	@	2.00
New Kraft Cuts	2.25	@	2.30
Roofing Stock, f.o.b. Chicago, Net Cash—			
No. 1	25.00	@	
No. 2	23.00	@	
No. 3	21.00	@	
No. 4	21.00	@	

PHILADELPHIA

[FROM OUR REGULAR CORRESPONDENT.]

Paper

Bonds	.10	@	.60
Ledgers	.15	@	.40
Writings—			
Superfine	.15	@	.20
Extra fine	.12	@	.22
Fine	.20	@	.30
Fine, No. 2	.20	@	.25
Fine, No. 3	.15	@	.20
Book, M. F.	.06	@	.09
Book, S. S. & C.	.08	@	.15
Book, Coated	.08	@	.15
Coated Lithograph.	.10	@	.15
Label	.08	@	.15
News	.05	@	.07
No. 1 Jute Manila	.12	@	.13
Manila Sul., No. 1	.08	@	.08½
Manila No. 2	.07½	@	.08
No. 2 Kraft	—	@	.08½
No. 1 Kraft	—	@	.09½
Common Bogus	.02½	@	.03
Straw Board	35.00	@	45.00
News Board	32.50	@	35.00
Chip Board	27.50	@	32.00
Wood Pulp Board	90.00	@	100.00
(Carload Lots)			
Binder Boards—			
Per ton	$65.00	@	75.00
Carload lots	60.00	@	65.00
Tarred Felts—			
Regular	48.00	@	50.00
Slaters	54.00	@	56.00
Best Tarred, 1-ply (per roll)	1.35	@	1.50
Best Tarred, 2-ply (per roll)	1.00	@	1.15
Best Tarred, 3-ply	1.50	@	1.65

Bagging

F. o. b. Phila.

Gunny No. 1—			
Foreign	.75	@	—
Domestic	.70	@	—
Manila Rope	4.00	@	4.50
Sisal Rope	.75	@	.80
Mixed Rope	.75	@	.80
Scrap Burlaps	1.00	@	1.25
Wool Tares, heavy	2.50	@	2.75
Mixed Strings	.75	@	.80
No. 1, New Lt. Burlap	.75	@	.21
New Burlap Cuttings	1.75	@	2.10

Old Papers

F. o. b. Phila.

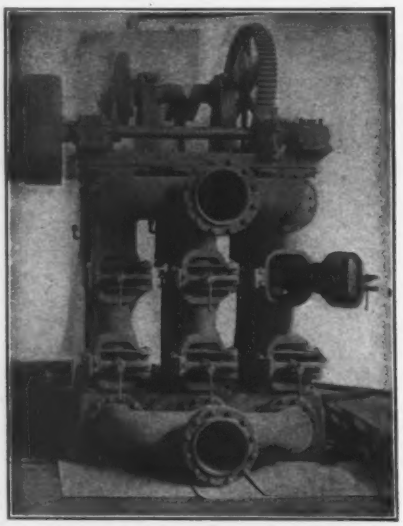
Shavings—			
No. 1, Hard White	3.50	@	3.75
No. 2, Hard White	3.00	@	3.25
No. 1 Soft White	3.00	@	3.25
No. 2 Soft White	1.75	@	2.00
No. 1 Mixed	1.50	@	1.75
No. 2 Mixed	1.00	@	1.25

(Continued on page 413)

The Black-Clawson Co.

Hamilton, Ohio

Builders of All Types of Paper Making Machines and Machinery



for PAPER and PULP MILLS

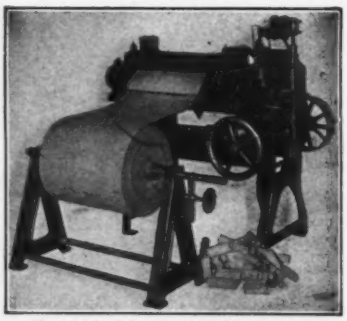
Successful machines in operation are proof our work is built right.

Dietz Toilet Paper Machinery

AND LATEST IMPROVED PATENTED

Automatic Tube Machines

For Making Tubes for Toilet Paper Rolls, Paper Towel Rolls



Patented Feb. 22, 1916, May 18, 1920.

Capable of producing 3,600

Toilet Tubes

per hour direct from roll.

Towel Tubes

are made at rate of 1,800 per hour. Substantially built and fully guaranteed.

Toilet Paper Machines for making Toilet Rolls with or without perforations and machines for making Sanitary Crêpe Paper Towels, Punch Presses for Sheet Toilet Paper, Drop Roll Slitters, Slitting and Rewinding Machines, Side and Center Seam Merchandise Envelope Machines, Photo Mount Beveling Machines, Candy Bag Machines, Punch Presses for Playing Cards, Rotary Card Cutting and Collating Machines, Etc.

DIETZ MACHINE WORKS

126-128 Fountain Street PHILADELPHIA, PA.

Corner Waterloo St., Below Diamond St., Bet. Front and 2d Sts.

Statement of the ownership, management, circulation, etc., required by the Act of Congress of August 24, 1912, of PAPER TRADE JOURNAL, published weekly at New York, N. Y., for April 1, 1922.—State of New York, County of New York. Before me, a notary public in and for the State and County aforesaid, personally appeared Leslie R. Palmer, who having been duly sworn according to law, deposes and says that he is the business manager of the PAPER TRADE JOURNAL and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management (and if a daily paper, the circulation), etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, embodied in section 443, Postal Laws and Regulations, printed on the reverse of this form, to wit: 1. That the names and addresses of the publisher, editor, managing editor, and business manager are:—Publisher, The Lockwood Trade Journal Co., Inc., 10 East 39th street, New York, N. Y.; editor, H. J. Berger, 10 East 39th street, New York, N. Y.; managing editor, H. J. Berger, 10 East 39th street, New York, N. Y.; business manager, Leslie R. Palmer, 10 East 39th street, New York, N. Y. 2. That the owners are (give names and addresses of individual owners, or, if a corporation, give its name and the names and addresses of stockholders owning or holding 1 per cent. or more of the total amount of stock): The Lockwood Trade Journal Co., Inc., 10 East 39th street, New York, N. Y.; Stockholders: Leslie R. Palmer, 10 East 39th street, New York, N. Y.; J. D. Maley, trustee of the Estate of Charles H. Jones, dead, Daytona, Fla.; J. D. Maley, guardian for Elizabeth, Jocelyn and Kathryn Maley, Daytona, Fla.; Mrs. M. G. Duck, Decatur, Ga.; Dorothy Martyn Freeman, Bat Cave, N. C. 3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent. or more of total amount of bonds, mortgages, or other securities are:—There are none. 4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company, but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

LESLIE R. PALMER, Business Manager.

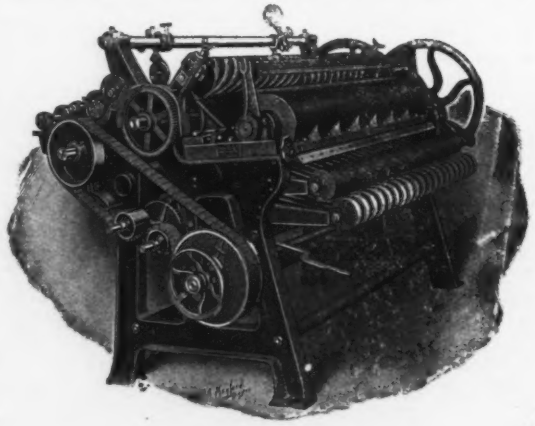
Sworn to and subscribed before me this 31st day of March, 1922.

[SEAL.] EDWARD H. LAWTON,

(My commission expires March 30, 1922.)

Paper Cutters

Single, Duplex and Diagonal



Cutter Knives Patent Top Slitters

HAMBLET MACHINE CO.

Lawrence, Mass.

Imports and Exports of Paper and Paper Stock

NEW YORK, BOSTON, PHILADELPHIA AND OTHER PORTS

NEW YORK IMPORTS

WEEK ENDING APRIL 8, 1922

SUMMARY

Printing Paper.....62 cs., 135 bls., 563 rolls.
News Print.....328 rolls, 62 bls.
Wall Paper.....12 bls. 42 cs.
Hangings.....7 bls.
Cigarette Paper.....119 cs.
Photo Paper.....10 cs.
Writing Paper.....13 cs.
Drawing Paper.....56 cs.
Surface Coated Paper.....101 cs.
Crepe Paper.....59 cs.
Filter Paper.....3 cs.
Wrapping.....434 bls. 239 rolls.
Packing Paper.....381 rolls, 58 bdls., 70 bls.
Miscellaneous Paper....345 bls., 465 rolls, 130 cs.

CIGARETTE PAPER.

P. J. Schweitzer, La Bourdonnais, Havre, 50 cs.
British American Tobacco Co., Nessian, Liverpool, 39 cs.
British American Tobacco Co., Cameronia, Liverpool, 30 cs.

PRINTING PAPER.

Oxford University Press, Cameronia, Liverpool, 6 cs.
Central Card & Paper Co., Lord Ormonde, Hamburg, 135 bls.
Chemical Nat'l Bank, Bayern, Hamburg, 59 rolls.
Chemical Nat'l Bank, by same, 45 rolls.
Agar, Berusson Corp., Orduna, Hamburg, 363 rolls.
First Federal Foreign B'k'g Corp., Minnekahda, Hamburg, 96 rolls.
F. G. Prager Co., by same, 34 cs.
B. F. Drakenfeld & Co., Nessian, Liverpool, 22 cs.

NEWS PRINT.

Superior Card & Paper Co., Lord Ormonde, Hamburg, 62 bls.
Agros Corp., by same, 109 rolls.
Hudson Trading Co., Susquehanna, Bremen, 50 rolls.
Chemical Nat'l Bank, America, Bremen, 169 rolls.

WALL PAPER.

A. Murphy & Co., Baltic, Liverpool, 2 bls.
A. Murphy & Co., Cameronia, Liverpool, 4 bls.
R. F. Downing & Co., Hague Maru, Yokohama, 40 cs.
Bech, Van Siclen & Co., by same, 2 cs.
A. Murphy & Co., Nessian, Liverpool, 6 bls.

PAPER HANGINGS.

A. C. Dodman, Jr., Nessian, Liverpool, 7 bls.

PHOTO PAPER.

J. J. Gavin, Baltic, Liverpool, 3 cs.
Hensel, Bruckman & Lorbacher, Minnekahda, Hamburg, 7 cs.

WRITING PAPER.

C. H. Boulin, Britannia, Marseilles, 13 cs.

DRAWING PAPER.

C. H. Boulin, Britannia, Marseilles, 56 cs.

SURFACE COATED PAPER.

Defender Photo Supply Co., Susquehanna, Bremen, 101 cs.

CREPE PAPER.

Globe Shipping Co., Ryndam, Rotterdam, 59 cs.

RAGS, BAGGING, ETC.

B. D. Kaplan & Co., Cameronia, Glasgow, 867 bls. rags.
Stone Bros., Sherwin Co., by same, 52 bls. rags.
Mutnick Bros., by same, 77 bls. rags.
Goldman, Sachs & Co., Paris, Havre, 68 bls. rags.
Irving Nat'l Bank, Lapland, Antwerp, 185 bls. flax waste.
F. P. Gaskell & Co., Susquehanna, Bremen, 35 bls. rags.
F. P. Gaskell & Co., Seydlitz, Bremen, 152 bls. rags.
E. Butterworth & Co., Nessian, Liverpool, 46 bls. paper stock.
B. D. Kaplan & Co., by same, 125 bls. rags.
B. D. Kaplan & Co., Baltic, Liverpool, 50 bls. rags.
R. F. Downing & Co., by same, 20 bls. rags.
R. F. Downing & Co., Ryndam, Rotterdam, 429 bls. rags.
E. J. Keller & Co., Inc., by same, 54 bls. rags.
W. Hughes & Co., by same, 251 bls. shoppery.
J. M. Jaffe, Editor, Rotterdam, 36 bls. rags.
Castle, Gottheil & Overton, Chicago, Havre, 74 bls. rags.
Castle, Gottheil & Overton, Galile, Hull, 73 bls. rags.

OLD ROPE.

J. Perlman, Nlua, Pt. Limon, 11 coils.
American Express Co., La Bourdonnais, Havre, 3,144 pgs.
American Express Co., France, Havre, 138 pgs.

WOOD PULP.

Tidewater Papermills Co., Favonian, Liverpool, N. S., 7,279 bls., 727 tons.
Tidewater Papermills Co., H. D. McLean, Liverpool, N. S., 8,111 bls., 811 tons.
A. J. Pagel & Co., Inc., Romsdalshorn, Gefle, 2,922 bls.
F. Enders & Co., by same, 9,853 bls.
Scandinavian American Trading Co., by same, 2,653 bls.
H. Hollesen, Seydlitz, Bremen, 2,650 bls.
H. Hollesen, Bayern, Hamburg, 4,150 bls., 830 tons.
H. Hollesen, America, Bremen, 3,250 bls.
Castle, Gottheil & Overton, by same, 1,765 bls.
Castle, Gottheil & Overton, Orduna, Hamburg, 1,000 bls.
E. M. Sergeant Co., Minnekahda, Hamburg, 700 bls.
Nilsen, Lyon Co., Inc., Susquehanna, Bremen, 800 bls., 101 tons.
In transit to St. Louis, Mo.:
Graham Paper Co., Cameronia, Liverpool, 3 cs. tissue paper.
To Adams, Mass.:
L. L. Brown Paper Co., Stanmore, Leith, 71 bls. rags.
Boston, Mass.:
G. M. Graves, Quaker City, London, 285 bls. rags.

FILTER PAPER.

Eimer & Amend, Ryndam, Rotterdam, 3 cs.

WRAPPING PAPER.

Wilkinson Bros. & Co., Inc., Editor, Rotterdam, 434 bls.
Wilkinson Bros. & Co., Inc., by same, 239 rolls.

PACKING PAPER.

Wilkinson Bros. & Co., Inc., Orduna, Hamburg, 381 rolls.
Wilkinson Bros. & Co., Inc., Minnekahda, Hamburg, 58 bdls.
Wilkinson Bros. & Co., Inc., by same, 70 bls.

PAPER.

C. A. Johnson Co., Baltic, Liverpool, 37 bls.
R. F. Downing & Co., Susquehanna, Bremen, 12 rolls.
H. Reeve Angel & Co., by same, 453 rolls.
H. Reeve Angel & Co., by same, 308 bls.
Globe Shipping Co., Bayern, Hamburg, 74 cs.
Hensel, Bruckman & Lorbacher, by same, 4 cs.
J. W. Hampton, Jr., Co., by same, 40 cs.
Hensel, Bruckman & Lorbacher, Minnekahda, Hamburg, 12 cs.

BALTIMORE IMPORTS

WEEK ENDING APRIL 8, 1922

W. H. Masson, Quaker City, London, 139 coils old rope.
Hudson Trading Co., Frode, Christiania, 400 tons wood pulp.
M. Gottesman Co., Inc., by same, 117 reels news print.
M. Gottesman Co., Inc., Virginia, Christiania, 3,000 bls. wood pulp.

PHILADELPHIA IMPORTS

WEEK ENDING APRIL 8, 1922

Castle, Gottheil & Overton, Eastern Dawn, Rotterdam, 44 bls. rags.
Castle, Gottheil & Overton, Ninestern Miller, London, 244 bls. rags.
Castle, Gottheil & Overton, Manchester Shipper, Manchester, 178 bls. rags.

NORFOLK IMPORTS

WEEK ENDING APRIL 8, 1922

Hudson Trading Co., Chappaqua, Hamburg, 261 rolls news print.

NEW ORLEANS IMPORTS

WEEK ENDING APRIL 8, 1922

Hudson Trading Co., Emergency Aid, Hamburg, 42 rolls news print.

SOME IMPROVEMENT IN PHILADELPHIA

The most satisfactory development of the week in the Philadelphia market was the appearance for the first time in ever so long of both inquiries and orders for the very high priced papers. While it is true that actual orders did not come in large volume, they were sufficient in number to establish a basis broad enough fairly to warrant the assumption that they might be taken as indications of the rising tide of demand. The fact that attention was directed to the appearance of business for these very high priced papers properly suggests that in the recent past there was little business done along these lines, but the importance of the week's development lies in the fact that it backs up the decided increase in inquiries and orders which have been enjoyed since March 1. Under these circumstances therefore, the trade believes it is warranted in characterizing the betterments of recent weeks as the real thing and not merely as a transient phenomena.

The fine paper business for the most part is in an excellent condition, all the circumstances of the case being considered. There has been no real recession of prices and the April lists which are now appearing show merely minor readjustments, but no material change in quotations. However, the fact remains that so far as book paper is concerned, the price is largely in the hands of the buyers, because at merest suspicion of the presence of a tonnage order, paper salesmen flock like bees into the buyer's office and prices are quoted apparently more with the object of landing the order than of making a profit. Mill prices have generally remained firm and the distributors report few reductions.

Job Lots, Rejections, Side Rolls Wanted

SPOT CASH paid for jobs in bond paper, white or colors, any grade that will cut down to 11 x 17, any weight. Send samples, with lowest spot cash prices. No lot too small, and none too large.

MIDWEST PAPER CO., 712 Federal Street, Chicago, Ill.

Salomon Bros. & Co.

IMPORTERS OF

All Grades of Rag and Paper Stock

200 FIFTH AVENUE, NEW YORK

COTTON WASTE :: LINTERS :: RAMIE

Special Shaped Carbon, Black Diamond POINTS FOR TURNING Paper, Cotton Chilled Iron and Hardened Steel Calender Rolls, Hard Rubber, Fibre, etc. Successor to John Dickinson, Established 1796. Agents for Great Britain, C. W. BURTON, GRIFFITHS & CO., Ludgate Square, London.

Manufactured by THOS. L. DICKINSON, 26 Gold St., NEW YORK

Penn Paper and Stock Company

PACKERS OF ALL GRADES OF

WASTE PAPER

240 N. FRONT STREET PHILADELPHIA

"WATERBURY"

W Felts-Jackets W

ORISKANY, N. Y.

OUR TIGHT FITTING, DIAMOND "W" JACKETS WILL NOT LICK UP AT ANY SPEED

1869 { MADE ONLY BY / GUARANTEED BY } 1921

H. WATERBURY AND SONS COMPANY, ORISKANY, N. Y.

Manufacturers of All Special Small Roll Products

Adding Machine, Cash Register, Die Wiping, Hand Rolls, Etc., Etc.

PAPER MANUFACTURERS CO., Inc., Phila., Pa.

WOOD FLOUR

Various degrees of fineness and either fibrous or granular. Made from first growth Spruce and Pine, by approved processes.

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Hudson Falls, N. Y.

UNION TALC COMPANY

Finest Grades of Agalite

132 Nassau Street New York

Established 1885

DANIEL M. HICKS

(INCORPORATED)

PAPER MILL SUPPLIES

200 Fifth Avenue New York City

WILLIAM B. DILLON

DILLON & BARNES

Paper Mill Products and Supplies

52 VANDERBILT AVENUE, NEW YORK

Telephone, 7353 Murray Hill

SHERMAN PAPER COMPANY

Manufacturers of Roll Newsprint

ENTIRE PRODUCT FOR 1922 CONTRACTED

Mills at

Felts Mills, Great Bend and Lafebvre, N. Y.

Main Office

Trust Co. Building, Watertown, N. Y.

FRANKLIN PAPER CO. HOLYOKE, MASS.

MANUFACTURERS OF

Index Bristols, White Bristol Blanks, Etc.

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UNITED STATES TALC CO.

GOUVERNEUR NEW YORK

SLITTERS AND WINDERS

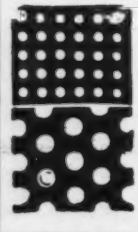
SAMUEL M. LANGSTON COMPANY

CAMDEN, N. J.

TRADE CAMACHINE MARK

SLITTERS AND WINDERS

CAMERON MACHINE CO. BROOKLYN N.Y.



MANHATTAN PERFORATED METAL CO.

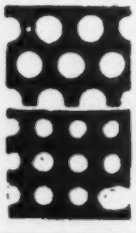
Office and Works: 237-239 Centre St., New York

PERFORATORS

of COPPER, BRASS, ZINC, ALUMINUM, TIN, STEEL, IRON, Etc.

Write for Copper, Brass, Tin or Aluminum Catalog.

Brass and Copper Centrifugal and Juice Strainer Plates a Specialty



Miscellaneous Markets

OFFICE OF THE PAPER TRADE JOURNAL,
WEDNESDAY, April 12, 1922.

BLEACHING POWDER.—Improvement is on its way in the bleach market and keeping step with increasing optimism in the paper field. A larger volume of bleach is being consumed than at this time last year although the demand still warrants improvement. The price has been lowered gradually to 1.65 to 1.75 cents a pound.

BLANC FIXE.—Blanc fixe is moderately active under the influence of a somewhat restricted demand from the paper mills. Buying is on a hand-to-mouth basis and small lots only are taken to replace depleted stocks. Blanc fixe pulp is quoted at $40 to $50 a ton, and powdered blanc fixe at 3.50 to 3.75 cents.

CASEIN.—Business is light in casein although some attempt has lately been made to stimulate the mills to buy in reports of a contemplated duty of 4½ cents a pound on imported casein upon which the domestic market is largely dependent. There is less of the commodity on the market than would be desirable on account of light importations from Argentina during the past year. Casein is quoted at 9.50 to 10.00 cents a pound.

CAUSTIC SODA.—The export demand for caustic is firming up and the domestic spot market somewhat stronger. It is expected that domestic mills will require a large tonnage this year and general betterment is anticipated. Caustic is now quoted at 3.25 cents a pound contract.

CHINA CLAY.—China clay is quiet and the market is still catering to a spasmodic demand. However, dealers are confident that the current year will be a good one and expect to turn over a large tonnage. Price is $6 to $8 a net ton for the unwashed, $8 to $10 for the washed, $13 to $18 for the imported.

LIQUID CHLORINE.—The demand for liquid chlorine is steady and light. It is quoted at 5.50 to 7.00 cents a pound, in 100-pound cylinders, depending upon quality. Consumers using large quantities can obtain lower prices.

ROSIN.—Improved foreign demand is doing its part in strengthening the rosin market. Grades E, F, and G are quoted at $5.35 per barrel of 280 pounds.

SALTCAKE.—A lage volume of saltcake is being absorbed by the glass trade and the paper mills are in the market more heavily than for some time. Chromecake is quoted at $18 a ton and acidcake at $20 to $21.

SATIN WHITE.—Small quantities of satin white to replace depleted stocks are most in demand. The small stocks in hand should soon be depleted and buying stimulated by the simultaneous entry of numerous mills into the market. The price is 2.10 cents a pound, slightly shaded in second hands.

SULPHUR.—There is little prospect of any shortage in the sulphur supply for some time to come with one of the large companies with over 1,000,000 tons above ground at the present time. The demand from the paper industry is steady and gradually increasing as the mills operate at nearer capacity. Sulphur is quoted at $15 to $16 a net ton at the mines, and $18 to $19 a ton f.o.b. New York.

STARCH.—The starch market is fairly active, with a tendency toward improvement, if any change at all may be noted. Prices hold firm with bags selling at 2.22 cents a pound and barrels at 2.50 cents a pound carload quantities.

SULPHATE OF ALUMINA.—Movement of all heavy chemicals is retarded by the excessively high freight rates but should soon be loosened up by contemplated revision in the schedules. The mills continue to absorb the same volume of the commodity while a slightly firmer tone underlies the market. The commercial grade sells at 1.40 cents a pound and the iron free at 2.00 to 2.25 cents a pound, depending upon packing and quantity.

Market Quotations

(*Continued from page 409*)

Solid Ledger Stock.	2.00	@	2.25
Writing Paper....	1.80	@	2.00
No. 1 Books, heavy.	1.50	@	1.75
No. 2 Books, light.	1.25	@	1.50
No. 1 New Manila.	2.75	@	3.00
No. 1 Old Manila..	1.50	@	1.75
Container Manila..	1.00	@	1.10
Old Kraft	1.90	@	2.00
Overissue News....	.75	@	.80
Old Newspaper....	.50	@	.60
No. 1 Mixed Paper.	.45	@	.50
Common Paper....	.40	@	.50
Straw Board, Chip.	.40	@	.45
Binders' Bd. Chip.	.40	@	.45

Domestic Rags—New
Price to Mill, f. o. b. Phila.

Shirt Cuttings—			
New White, No. 1	.09¼	@	.09¾
New White, No. 2	.05	@	.06
Silesias, No. 1..	.04½	@	.05
New Unbleached.	.08½	@	.08¾
Washables	.03	@	.03½
Fancy	.04½	@	.05
Cottons—according to ...			
Blue Overall	.04	@	.04½
New Blue	.02	@	.02¼
New Black Soft.	.03	@	.03¼
New Light Seconds	.02	@	.02¼
Khaki Cuttings...	.02¾	@	.03¼
Corduroy	.02	@	.02½
New Canvas	.07	@	.07½
New Black Mixed	2.75	@	3.00

Old

White, No. 1—			
Repacked	.06	@	.06½
Miscellaneous ...	.04½	@	.04¾
White, No. 2—			
Repacked	.03	@	.03½
Miscellaneous ...	.02¾	@	.02⅞
Thirds and ...			
Repacked	1.65	@	1.80
Miscellaneous ...	1.40	@	1.55
Black stockings...	1.75	@	2.45
Roofing Stock—			
No. 1.....	.90	@	1.00
No. 2.....	.80	@	.90
No. 3.....	.70	@	.80
No. 4.....	.70	@	.80
No. 5A.....	nominal		
B.....	nominal		
C.....	nominal		

BOSTON

[FROM OUR REGULAR CORRESPONDENT.]

Paper

Bonds	.07	@	—
Ledgers	.09	@	.09½
Writings	.04½	@	.05
Superfine	.12	@	.13
Fine	.10	@	.10½
Books, S. & S. C...	.07	@	.07½
Books, M. F.....	—	@	.06½
Books, coated	.07	@	.07½
Label	—	@	.10
News sheets	3.75	@	
News, rolls	.05	@	
Manilas—			
No. 1 Manila....$6.75		@	
No. 1 Fibre.....	8.00	@	
No. 1 Jute.....	8.50	@	9.00
Kraft Wrapping....	7.00	@	
Common Bogus....	3.00	@	

Boards

(Per Ton Destination)

Chip $35.00		@	
News, Vat Lined...	37.50	@	39.00
Wood, Vat Lined..	47.50	@	
Filled News Board.	37.50	@	
Solid News Board..	42.50	@	45.00
S. Manila Chip....	52.50	@	
Pat. Coated 70.00		@	75.00

Old Papers

Shavings—			
No. 1 Hard White	.04½	@	.05
No. 1 Soft White	.03	@	—
No. 1 Mixed....	—	@	.08
Ledgers & Writings.	.03	@	—
Solid Books		@	$1.35
Blanks $1.30		@	$1.45
No. 2 Books Light.	.60	@	.70
Folded News, over issues $11.50		@	12.50
Mixed paper.....	.50	@	
Gunny Bagging ...	.80	@	
Manila Rope	.04	@	.04½
Common Paper.....	8.00	@	
Old News.....	.80	@	
Old Kraft.....	1.75	@	

TORONTO

[FROM OUR REGULAR CORRESPONDENT.]

Paper

(Mill Prices to Jobbers f. o. b. Mill)

Bond—			
Sulphite	11	@	12½
Light tinted.....	12	@	13½
Dark tinted.....	13½	@	15
Ledgers (sulphite).	—	@	13
Writing	10½	@	13½
News, f. o. b. Mills—			
Rolls (carloads).	3.50	@	
Sheets (carloads)	—	@	4.25
Sheets (2 tons or over)	—	@	4.50
Book—			
No. 1 M. F. (carloads)	9.50	@	—
No. 2 M. F. (carloads)	8.50	@	—
No. 3 M. F. (carloads)	8.00	@	—
No. 1 S. C. (carloads)	10.00	@	—
No. 2 S. C. (carloads)	9.00	@	—
No. 1 Coated and litho. 15.00		@	—
No. 2 Coated and litho. 14.00		@	—
No. 3 Coated and litho. 13.25		@	—
Coated and litho., colored 15.25		@	—
Wrapping—			
Grey	4.75	@	—
White Wrap.....	5.25	@	—
"B" Manila.....	5.75	@	—
No. 1 Manila....	7.50	@	—
Fibre	7.25	@	—
Kraft, M. F. or M. G.	8.75	@	—

Pulp

(F. o. b. Mill)

Ground Wood.....$25.00		@	$32.50
Sulphite easy bleaching	60.00	@	65.00
Sulphite, news grade.	50.00	@	60.00
Sulphite bleached...	90.00	@	95.00
Sulphate	70.00	@	

Old Waste Papers

(In carload lots, f. o. b. Toronto)

Shavings—			
White Env. Cut..	4.00	@	—
Soft White Book Shavings	3.15	@	—
White Bl'k News	1.70	@	—
Book and Ledger—			
Flat Magazine and Book Stock (old)	1.45	@	—
Light and Crumpled Book Stock	1.30	@	—
Ledgers and Writings	1.80	@	—
Solid Ledgers....	1.80	@	—
Manilas—			
New Manila Cut.	2.00	@	—
Printed Manilas..	.90	@	—
Kraft	2.25	@	—
News and Scrap—			
Strictly Overissue	.90	@	—
Folded News....	.90	@	—
No. 1 Mixed Papers	.60	@	—
Domestic Rags—			
Price to mills, f.o.b. Toronto.		Per lb.	
No. 1 White shirt cuttings	.09¾	@	.10
No. 2 White shirt cuttings	.05½	@	.05¾
Fancy shirt cuttings	.05½	@	.05¾
No. 1 Old whites	.04	@	—
Thirds and blues	.02	@	.02¼
		Per cwt.	
Black stockings...	1.75	@	1.85
Roofing stock			
No. 1.....	1.25	@	—
No. 2.....	1.15	@	—
Roofing stock			
Manila rope.....	.04½	@	04½
No. 2.....	.01½	@	—
Gunny bagging	1.00	@	1.25

BAKER MANUFACTURING CORPORATION

Formerly

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Sole Manufacturers of

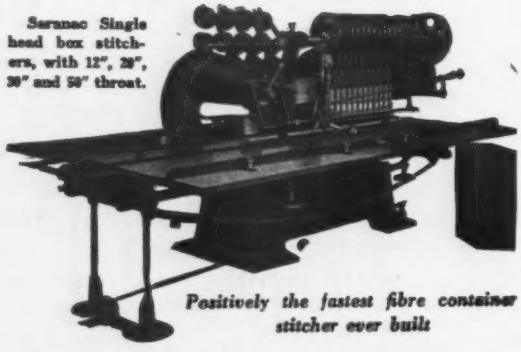
THE MAGAZINE GRINDER

For the United States of America. This is the grinder that is making all of the ground wood manufactured by the Laurentide Co., Grand Mere, Quebec, as used on their new paper making machines, the largest in many ways and fastest running (1020 ft. per minute) in the world.

BAKER MANUFACTURING CORPORATION, Saratoga Springs, N.Y.

25 to 40 shipping containers per minute can be made on a

Saranac Automatic Multiple Head Stitcher



Saranac Single head box stitchers, with 12", 20", 30" and 50" throat.

Positively the fastest fibre container stitcher ever built

IT is equipped with twelve stitching heads, so that any number from 1 to 12 staples can be driven at one time. Either a single or double row of staples, or single row with the tie stitch, are automatically driven. It takes less than five minutes to change from the largest to smallest size containers.

Write for Full Particulars.

We also manufacture Bottom Sealing Machines.

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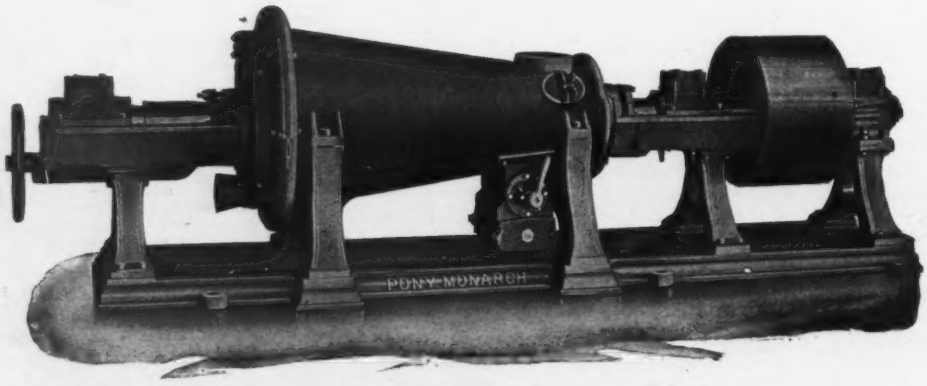
Benton Harbor, Michigan

WE MAKE BEATERS AND JORDANS OF QUALITY

SIX SIZES OF JORDANS, BEATERS, FROM ¾ LBS. TO 3000 LBS.



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COLORS FOR
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WE offer the Paper Industry of the United States all colors for Beater, Calender, and for coating, and place at the disposal of Paper Makers our well equipped Paper Laboratories for the accurate and expeditious solution of problems relating to the application and cost of colors for paper.

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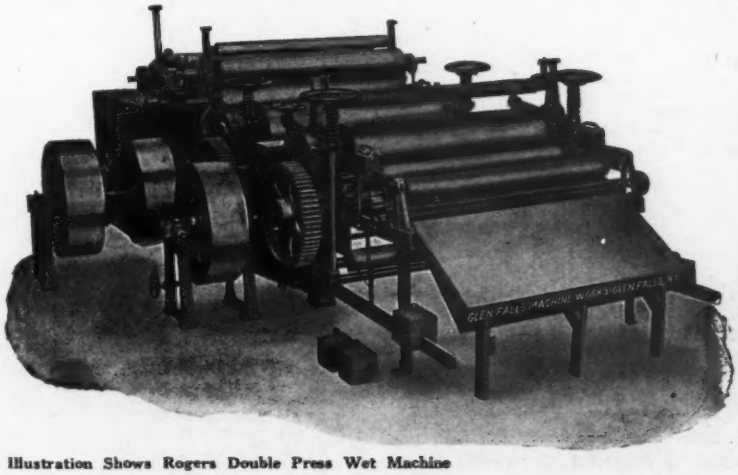
ROGERS WET MACHINE



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FOR CHEMICAL PULP—including Sulphite, Sulphate, Soda, also Cotton and Waste Paper fiber.

TYPES—Single and Double Press 72" wide.

CAPACITY—either type 25-30 tons air dry stock per 24 hours.

SHEETS produced by the Double Press Machine uniformly 48% dry. By the Single Press Machine uniformly 40% dry. There is no fold to contain excessive moisture. Sheets are handy size, 33"x36", and are folded once into most convenient bundles for storage, for the beater or for shipping. By this great capacity, high dry test, small amount of floor space per ton pulp produced, exceedingly low cost for labor and maintenance, users are assured that the machine will completely pay for itself within one year, and are promised a handsome return on their investment.

WORKMANSHIP AND MATERIAL GUARANTEED

GLENS FALLS MACHINE WORKS Glens Falls, N. Y.

Try Our Split Cams for Your Flat Screens

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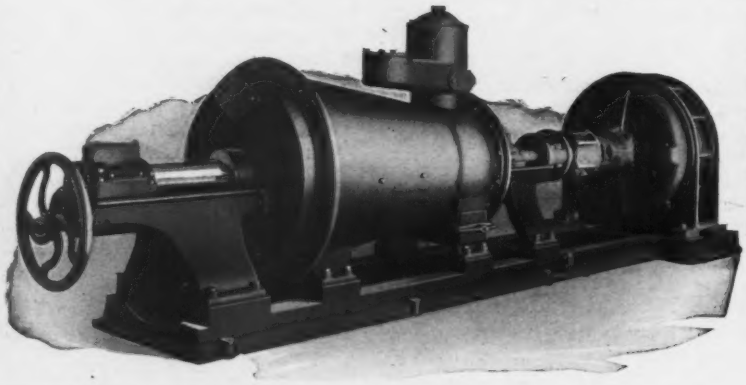

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